

Leading and Managing through Influence

Challenges and Responses

Dr. Raymond A. Shulstad, Brigadier General, USAF, Retired
with Lt Col Richard D. Mael, USAF, Retired

The Role of Airpower in Active Missile Defense

Col Mike Corbett, USAF, Retired
Paul Zarchan

New Horizons

Coalition Space Operations
Lt Col Thomas G. Single, USAF

Beddown Options for Air National Guard C-27J Aircraft

Supporting Domestic Response
Col John Conway, USAF, Retired

Building an Offensive and Decisive PLAAF

A Critical Review of Lt Gen Liu Yazhou's *The Centenary
of the Air Force*

Guocheng Jiang



Chief of Staff, US Air Force
Gen Norton A. Schwartz

**Commander, Air Education
and Training Command**
Gen Stephen R. Lorenz

Commander, Air University
Lt Gen Allen G. Peck

Director, Air Force Research Institute
Gen John A. Shaud, USAF, Retired

Chief, Professional Journals
Lt Col Paul D. Berg

Deputy Chief, Professional Journals
Maj Darren K. Stanford

Editor
Capt Lori Katowich

Professional Staff
Marvin W. Bassett, *Contributing Editor*
Tammi K. Long, *Editorial Assistant*
Daniel M. Armstrong, *Illustrator*
L. Susan Fair, *Illustrator*
Ann Bailey, *Prepress Production Manager*

The *Air and Space Power Journal* (ISSN 1554-2505), Air Force Recurring Publication 10-1, published quarterly, is the professional journal of the United States Air Force. It is designed to serve as an open forum for the presentation and stimulation of innovative thinking on military doctrine, strategy, force structure, readiness, and other matters of national defense. The views and opinions expressed or implied in the *Journal* are those of the authors and should not be construed as carrying the official sanction of the Department of Defense, Air Force, Air Education and Training Command, Air University, or other agencies or departments of the US government.

Articles in this edition may be reproduced in whole or in part without permission. If they are reproduced, the *Air and Space Power Journal* requests a courtesy line.



<http://www.af.mil>



<http://www.aetc.randolph.af.mil>



<http://www.au.af.mil>

Air and Space Power Journal
155 N. Twining Street
Maxwell AFB AL 36112-6026

e-mail: aspj@maxwell.af.mil

Visit *Air and Space Power Journal* online
at <http://www.airpower.au.af.mil>.

Senior Leader Perspective

Leading and Managing through Influence | 6 Challenges and Responses

Dr. Raymond A. Shulstad, Brigadier General, USAF, Retired
with
Lt Col Richard D. Mael, USAF, Retired

From the Editor

The Art of Persuasion | 18

Capt Lori Katowich, USAF, Editor

Features

The Role of Airpower in Active Missile Defense | 57

Col Mike Corbett, USAF, Retired
Paul Zarchan

The authors examine what airpower, as opposed to surface and space forces, brings to defense against the changing and growing threat of theater ballistic missiles. They consider whether combat air forces should have a primary role in this mission and whether the Air Force can afford a new mission area without jeopardizing its traditional core capabilities.

New Horizons | 72 Coalition Space Operations

Lt Col Thomas G. Single, USAF

The author analyzes inefficiencies in the NATO-led International Security Assistance Force in Afghanistan, arguing for the inclusion of robust coalition space operations. Noting that coalition operations require the leveraging of all available resources, including critical enablers such as space capabilities, he promotes coalition space support teams as the most effective means of mitigating current challenges.

20 | Ricochets and Replies

23 | Views & Analyses

Should the United States Maintain the Nuclear Triad? 23
 Dr. Adam B. Lowther

Updating a Cold War Relic: Ensuring That the New
 Air Force Doctrine Document 3 Reflects Current Air Force
 Roles and Missions 30
 Lt Col David K. Moeller, USAF

Beddown Options for Air National Guard C-27J Aircraft:
 Supporting Domestic Response 35
 Col John Conway, USAF, Retired

Finishing Strong in Iraq: Why the Air Force Must Be the
 Last to Leave Operation Iraqi Freedom 45
 Lt Col William Jay Martin, USAF

Colombia Can Teach Afghanistan (and the United States)
 How to Win 52
 Robert Haddick

85 | Review Essay

Building an Offensive and Decisive PLAAF: A Critical Review
 of Lt Gen Liu Yazhou’s *The Centenary of the Air Force* 85
 Guocheng Jiang

95 | Book Reviews

Wired for War: The Robotics Revolution and Conflict in
 the 21st Century 95
 P. W. Singer
 Reviewer: Wing Cdr John M. Shackell, RAF, Retired

The International Politics of Space 96
 Michael Sheehan
 Reviewer: Lt Col Kevin M. Rhoades, USAF

Killing Pablo: The Hunt for the World’s Greatest Outlaw 97
 Mark Bowden
 Reviewer: Lt Col Paul D. Berg, USAF

The War: An Intimate History, 1941–1945	98
Geoffrey C. Ward and Ken Burns	
Reviewer: Lt Col Daniel J. Simonsen, USAF	
The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War	99
Sharon Ghamari-Tabrizi	
Reviewer: Col Joe McCue, USAF, Retired	
The Development of Propulsion Technology for U.S. Space-Launch Vehicles, 1926–1991	100
J. D. Hunley	
Reviewer: Capt Brent D. Ziarnick, USAFR	
Governing the American Lake: The US Defense and Administration of the Pacific, 1945–1947	101
Hal M. Friedman	
Reviewer: Dr. John H. Barnhill	
In the Shadow of the Moon: A Challenging Journey to Tranquility, 1965–1969	102
Francis French and Colin Burgess	
Reviewer: Dr. Rick W. Sturdevant	
The Road to Safwan: The 1st Squadron, 4th Cavalry in the 1991 Persian Gulf War	103
Stephen A. Bourque and John W. Burdan III	
Reviewer: Maj Paul Niesen, USAF, Retired	
Breaking the Mold: Tanks in the Cities	104
Kendall D. Gott	
Reviewer: Capt Michael D. Kennedy, USAF	
Unknown Soldiers: Reliving World War II in Europe	105
Joseph E. Garland	
Reviewer: Dr. Donald A. MacCuish	
NATO's Gamble: Combining Diplomacy and Airpower in the Kosovo Crisis, 1998–1999	106
Dag Henriksen	
Reviewer: Maj Lisa Nemeth, USAF	
Reflections of an Air Warrior	107
Group Capt Arjun Subramaniam	
Reviewer: Dr. David R. Mets	
Hans-Joachim Marseille: An Illustrated Tribute to the Luftwaffe's "Star of Africa"	107
Robert Tate	
Reviewer: Dr. Richard R. Muller	

The Star Wars Enigma: Behind the Scenes of the Cold War Race for Missile Defense 108
Nigel Hey
Reviewer: Maj Eric J. Kolb, USAF

Preparing the Army for Stability Operations: Doctrinal and Interagency Issues 109
Thomas S. Szayna, Derek Eaton, and Amy Richardson
Reviewer: CSM James Clifford, USA, Retired

Educating Information: Interrogation: Science and Art: Foundations for the Future 110
Intelligence Science Board
Reviewer: Lt Col Christopher D. Harness, USAF

111 | Mission Debrief



Editorial Advisory Board

Gen John A. Shaud, PhD, USAF, Retired, *Air Force Research Institute*
Lt Gen Bradley C. Hosmer, USAF, Retired
Dr. J. Douglas Beason (Senior Executive Service and Colonel, USAF, Retired), *Air Force Space Command*
Dr. Alexander S. Cochran, *Office of the Chief of Staff, US Army*
Prof. Thomas B. Grasse, *US Naval Academy*
Lt Col Dave Mets, PhD, USAF, Retired, *School of Advanced Air and Space Studies (professor emeritus)*

Board of Reviewers

Lt Col Eric Braganca, USAF
Naval Air Station, Patuxent River, Maryland

Dr. Kendall K. Brown
NASA Marshall Space Flight Center

Col Steven D. Carey, USAF, Retired
Daphne, Alabama

Dr. Clayton K. S. Chun
US Army War College

Dr. Mark Clodfelter
National War College

Dr. Conrad Crane
Director, US Army Military History Institute

Col Michael D. Davis, USAF
Defense Attaché

Col Dennis M. Drew, USAF, Retired
USAF School of Advanced Air and Space Studies
(professor emeritus)

Maj Gen Charles J. Dunlap Jr., USAF
The Pentagon

Dr. Stephen Fought
USAF Air War College (professor emeritus)

Col Richard L. Fullerton, USAF
USAF Academy

Lt Col Derrill T. Goldizen, PhD, USAF, Retired
Westport Point, Massachusetts

Col Mike Guillot, USAF, Retired
Editor, *Strategic Studies Quarterly*
Air Force Research Institute

Dr. John F. Guilmartin Jr.
Ohio State University

Dr. Amit Gupta
USAF Air War College

Dr. Grant T. Hammond
Dean, NATO Defence College

Dr. Dale L. Hayden
Air Force Research Institute

Dr. Thomas Hughes
USAF School of Advanced Air and Space Studies

Lt Col Jeffrey Hukill, USAF, Retired
Air Force Research Institute

Lt Col J. P. Hunerwadel, USAF, Retired
LeMay Center for Doctrine Development and Education

Col Mark P. Jelonek, USAF
The Pentagon

Col John Jogerst, USAF, Retired
Navarre, Florida

Mr. Charles Tustin Kamps
USAF Air Command and Staff College

Dr. Tom Keane
Johns Hopkins University

Col Merrick E. Krause, USAF, Retired
Department of Homeland Security

Col Chris J. Krisinger, USAF, Retired
Burke, Virginia

Dr. Benjamin S. Lambeth
RAND

Mr. Douglas E. Lee
Air Force Space Command

Dr. Richard I. Lester
Eaker Center for Professional Development

Mr. Brent Marley
Redstone Arsenal, Alabama

Mr. Rémy M. Mauduit
Air Force Research Institute

Col Phillip S. Meilinger, USAF, Retired
West Chicago, Illinois

Dr. Daniel Mortensen
Air Force Research Institute

Dr. Richard R. Muller
USAF School of Advanced Air and Space Studies

Dr. Bruce T. Murphy
Air University

Col Robert Owen, USAF, Retired
Embry-Riddle Aeronautical University

Lt Col Brian S. Pinkston, USAF, MC, SFS
The Pentagon

Col Bob Potter, USAF, Retired
Air Force Research Institute

Dr. Steve Rothstein
Colorado Springs Science Center Project

Lt Col Reagan E. Schaupp, USAF
Naval War College

Dr. Barry Schneider
Director, USAF Counterproliferation Center
Professor, USAF Air War College

Col Richard Szafranski, USAF, Retired
Toffler Associates

Lt Col Edward B. Tomme, PhD, USAF, Retired
CyberSpace Operations Consulting

Dr. Christopher H. Toner
University of St. Thomas

Lt Col David A. Umphress, PhD, USAFR, Retired
Auburn University

Dr. Harold R. Winton
USAF School of Advanced Air and Space Studies

Leading and Managing through Influence

Challenges and Responses

Dr. Raymond A. Shulstad, Brigadier General, USAF, Retired*
with
Lt Col Richard D. Mael, USAF, Retired

The key to successful leadership today is influence, not authority.

—Ken Blanchard

Many experts, including Ken Blanchard, argue legitimately that managing and leading are all about influencing people to accomplish tasks and objectives. Managing and leading through influence in the context used in this article present some unique challenges due to the absence of direct, hierarchical authority (i.e., not all of the people who need to be influenced work directly for the manager or leader). This type of challenge occurs naturally in a matrix organization, in which project managers are supported by functional-specialty experts (e.g., engineers, logisticians, financiers, etc.) who may or may not be collocated with the project team. The challenge of managing and leading through influence in this type of situation is somewhat mitigated because the head of the organization has directed that the project be carried out, has placed the project manager in charge to lead the effort, and has directed the functional leaders to sup-

port the project. Similarly, in a joint environment, the services have to rely on each other, but their component commanders all report to a joint force commander in charge of the campaign.

When the project requires the support not only of inside functional organizations but also of outside organizations with completely different reporting chains, the challenges become especially daunting. That is the environment I address in this article by examining a case study of the B-1B bomber nuclear-certification program that I led in the early 1980s. Managing and leading in this complex environment require the same basic skills as successfully managing and leading in an environment where direct hierarchical authority exists.¹ Attaining success without direct, hierarchical authority demands much more time and attention on enlisting commitment and support from both inside and outside the organization.

*I especially want to thank Lt Col Richard D. Mael, USAF, retired, my longtime professional colleague and close personal friend, for his extensive help in writing this article.

Rick Mael, who served 21 years in the US Air Force, was a missile combat crew member and held program-management positions in both the Air Force and Office of the Secretary of Defense. He also participated in the Air Force Education with Industry Program with the Northrop Corporation and served on the staff of the Air Force Program Executive Office for Strategic Systems. Currently, Mr. Mael is a program manager with Booz Allen Hamilton.



Skills in persuasion and negotiation also become much more important.

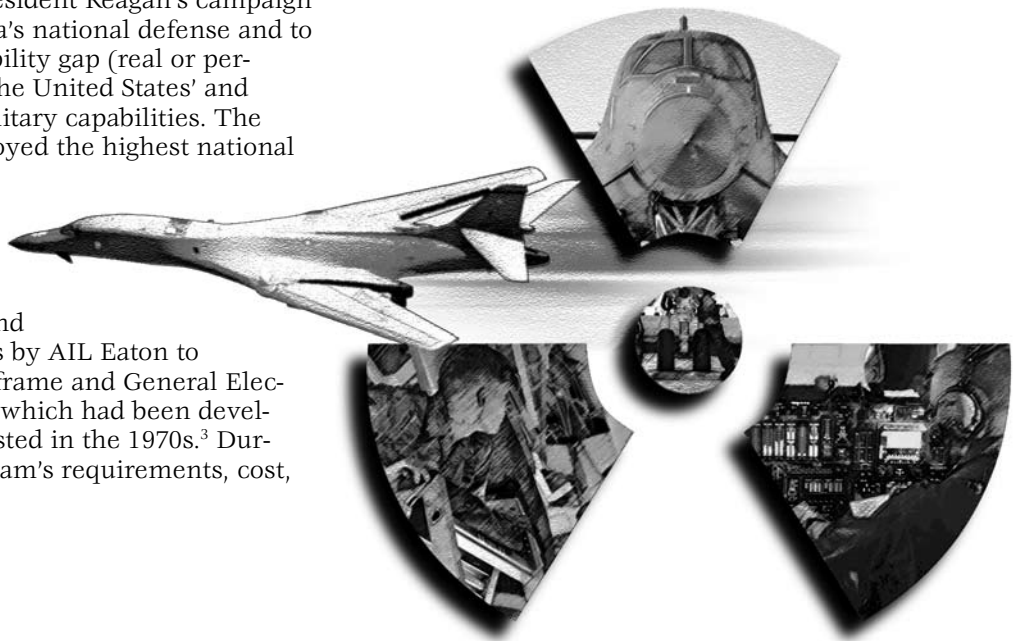
First I briefly offer some background on the B-1B and nuclear certification before describing the situation I faced when I arrived at the B-1B System Program Office (SPO) in the summer of 1982. Then, I move on to a discussion of challenges faced and actions taken to address them. The result was one of the proudest achievements of my Air Force career—nuclear certification of the B-1B 30 days before its initial operational capability (IOC) in September 1986, exactly as required and as I had planned four years earlier. Next, I summarize what I consider the “golden nuggets” or best practices, along with keys to success in managing and leading through influence across organization lines and in the absence of hierarchical authority. Finally, I conclude with a few remarks that I hope will prove valuable to today’s leaders facing the challenges of managing and leading in these kinds of complex environments.²

The B-1B Program

Restarting the B-1 program in 1981 was a cornerstone of President Reagan’s campaign to rebuild America’s national defense and to close the vulnerability gap (real or perceived) between the United States’ and Soviet Union’s military capabilities. The B-1B program enjoyed the highest national priority and unprecedented stability. It added modern offensive avionics by Boeing and defensive avionics by AIL Eaton to Rockwell’s B-1 airframe and General Electric’s B-1 engines, which had been developed and flight-tested in the 1970s.³ During 1981 the program’s requirements, cost,

and schedule were defined in great detail in a \$20.5 billion program baseline that would deliver 100 B-1Bs to the Air Force.⁴ Ultimately the secretary of defense, president, and Congress approved this baseline before Rockwell, Boeing, General Electric, and AIL Eaton received contracts in early 1982.

Several unique aspects of the B-1B are important to this case study. First, the program’s baseline remained under tight control at the secretary of defense level—that is, he approved all changes to requirements, cost, and schedule. This stability, coupled with leveraging the many years of work on the B-1, resulted in a program of moderate risk that the government and contractors could manage.⁵ This, in turn, enabled an aggressive schedule that included an IOC of September 1986 and delivery of all 100 bombers by May 1988. The schedule included significant concurrency between development and production. The well-defined baseline and moderate, manageable risk were keys to obtaining congressional approval of a multiyear procurement that saved a significant amount of money by securing government commitment to buy most of the



100 aircraft at the beginning of the program instead of incrementally each year.

Second, the program's management approach underwent extraordinary streamlining to save time and cost and to reduce oversight. From a program-management standpoint, the B-1B system program director (SPD) reported directly to the secretary of the Air Force and secretary of defense, bypassing the normal oversight levels within Air Force Systems Command, Headquarters US Air Force, and staff offices within the Office of the Secretary of Defense. Because of reduced oversight, the Air Force agreed to staff the B-1B program at about 200 people, about half the normal number for a program of this size and complexity. In 1982 the management model for sizable programs like the B-1B was a large project-management organization that would manage different elements of the program, supported by functional organizations in engineering, budget and program control, logistics, flight testing, safety, and so forth. In contrast the B-1B project office was very small, and the functional organizations were expected not only to support projects managed there, but also to provide management of key elements of the program. Nuclear certification was one of the few aspects managed out of the project office because it required support from almost all SPO functional organizations and a number of outside agencies.

Third, to save cost and streamline contract management, the B-1B SPO assumed responsibility for integrating the work of the four associate contractors, as it had on the original B-1 program. For the most part, the B-1B SPO's engineering organization managed this effort, using design reviews and a detailed set of interface-control documents as well as associate contractor agreements. Essentially, the government assumed the role usually played by the prime contractor.⁶ The engineering organization's leadership role offers a good example of what I mean by functional organizations assuming management responsibility ver-

sus just providing engineering support to project management.

Extraordinarily successful, the B-1B program reached its IOC and most other major milestones on time and within budget. Rick Mael attributed this success to detailed, upfront cost estimating; firm baselining; multi-year procurement; and the SPO's role as integrator.⁷ The B-1B's programmatic success and rapid deployment provided time for the development and production of the B-2 stealth bomber without further widening the vulnerability gap. Finally, as a key element in the United States' strategic force-modernization program, it played an important role in bringing about the collapse of the Soviet Union and ending the Cold War. In order to attain IOC, the B-1B needed nuclear certification.

Before a weapon system can be loaded with nuclear weapons, stand alert, and conduct nuclear missions, the secretary of defense must authorize it to do so by signing the nuclear-safety rules recommended by the secretary of the military service that would operate the weapon system. Prior to signing, the secretary of defense also reviews a report certifying the safety and compatibility of the weapon system from the secretary of energy, whose department designs, develops, and produces nuclear warheads. The secretary of defense's approval of the nuclear-safety rules represents the culmination of many years of analysis and testing to certify that the system is mechanically and electrically compatible with the weapons and can operate with and deliver nuclear weapons safely and accurately.⁸

Within the Department of Defense, the SPD is responsible for all aspects of system design, development, and production, including nuclear certification. Within the program office, the SPD designates a nuclear-certification program manager, directs SPO functional offices (engineering, safety, test, logistics, etc.) to provide support, and incorporates contractor support for the program in the appropriate contracts. The SPO's nuclear-certification pro-



gram manager gets interagency support for the program by forming a Project Officers' Group (POG), which he chairs and which has representatives from the SPO functional offices, the program contractors, the Department of Energy's laboratories, the major command that will operate the weapon system, the service's flight-test organization, the service's organization for nuclear weapon safety, and the service's inspector general (IG) organization for nuclear surety. The B-1B POG had over 60 members from a total of 14 organizations, five of which were SPO functional organizations. The other nine included outside agencies: two contractors (Rockwell and Boeing), Strategic Air Command (SAC), Air Force Weapons Laboratory, Air Force Flight Test Center, the Air Force IG's Directorate of Nuclear Surety (DNS), and three Department of Energy laboratories.⁹

During the development of weapon systems, POG members work together to complete required analyses and tests. Extensive environmental and mechanical testing assures that the nuclear weapon's design criteria are never exceeded from the time it leaves the weapons storage area until it reaches a target. Electrical testing certifies that the weapon system's avionics can communicate with the weapon's arming system, and dropping dummy weapons during flight testing confirms that the weapon system can safely and effectively deliver the weapon to target. In parallel with these activities, a nuclear-system safety study analyzes all potential hazards and formulates safety rules for the nuclear weapon system. Among other things, this study must prove beyond a shadow of doubt that the aircraft's avionics cannot inadvertently arm and drop the weapon. Ultimately, the results of these studies, analyses, and tests flow up separate and independent chains leading to the service secretary and secretary of energy, who both must certify that nuclear weapons can be safely and effectively included in the operational capability before the secretary of defense signs the nuclear weapon system's safety rules.

Situation and Status in the Summer of 1982

I reported to the B-1B SPO in July 1982, about seven months after contract awards restarted the program. After meeting Maj Gen William E. Thurman, the B-1B SPD, I checked in with Col Nick Fritz, the B-1B director of projects and my new boss. He introduced me to Capt Rick Mael, who, until I got there, was a one-man show, trying to work all aspects of the B-1B armament system, including weapon launchers, weapon-loading support equipment, and nuclear certification. In short, he was absolutely swamped and extremely glad to have a boss on board. I noticed the small size of the office that he and I were to share with another officer, so I asked him about the location of the rest of my team. He explained to me the SPO management concept, which involved support from functional-specialty experts in engineering, safety, logistics, and flight testing, who were in the SPO but not collocated with us.

Over the first couple of weeks, I walked around the SPO, meeting all of the functional-support members of the team. They all seemed to have a general grasp of the requirements of nuclear certification and their role in the process. In all cases, they had functional bosses inside the SPO and home-office bosses outside the SPO. None of them had been designated to support nuclear certification full time. For example, the four armament engineers were responsible for overseeing development and integration of the armament system and offensive avionics into the B-1B. Nuclear certification was just a small, but important, aspect of their total job. Although everyone seemed to understand the importance of nuclear certification and what they needed to do, there was no plan with assigned actions and accountability.

With the help of engineering, Rick had organized a POG and held a couple of meetings, but not much more had hap-

pened. I touched base with all of the non-SPO members from outside agencies, including the contractors, and found much the same situation (i.e., awareness of requirements but little or no action). Our Rockwell and Boeing contractor members told me that nuclear certification was not under contract. That troubled me because certification was absolutely essential, so I found it hard to believe it could have been left out of the B-1B's \$20.5 billion baseline contracts. I would spend a great deal of time over the next few months sorting out exactly what the contracts did and did not include and fixing the disconnects.

About a month after I arrived, I briefed General Thurman on nuclear certification, my requirements for obtaining it, and my approach and strategy. I took Rick with me to the general's office for the briefing and found that his staff had invited some of the SPO's chief functional experts. I told General Thurman that to succeed, I needed to have his support and commitment, sort out the contractual disconnects, get our contractors on board, develop a plan, and use the contractors and rest of the POG to execute the plan. I told him that the process normally takes six to 10 years, but I could complete it in four years to support the B-1B's IOC of September 1986 by leveraging work done on the original B-1 program, accelerating some activities, and executing some efforts in parallel rather than serially.

When I finished, I got a big thumbs-up from General Thurman and his direction to the functional experts to support me. It could not have gone better until the very end when the chief of program control (the program's financial manager) told the general that nuclear certification had been scrubbed from the \$20.5 billion baseline because its \$50 million price tag was too expensive. I told General Thurman that the contractors had told me the same thing but had not mentioned the cost. I then reiterated my briefing points that nuclear certification was not optional, that contractor support was essential, and

that I would sort out the contractual disconnects. I pledged to get back to him in a month or so with the cost and needed contractual changes.

A few weeks later, I held my first POG meeting, in which I introduced myself, presented the same briefing I had given General Thurman, and challenged the members to move beyond talking about what they needed to do and actually do something. I told them that business as usual would not be good enough to nuclear-certify the B-1B in time to support the IOC of September 1986; therefore, we would operate in a different mode. Finally, I told them that we needed to develop a plan with all actions identified and assigned to someone, as well as a schedule with which to monitor and manage progress. We had three POG subgroups in place for safety, aircraft compatibility, and logistics. Moreover, a SPO functional expert served as chairman of the subgroups, but the groups had not yet met. I broke the POG into the subgroups, directed them to spend the rest of the day organizing, and told them to plan a meeting within the next few weeks, after which they would lay out all of the actions in their area that needed to happen (and when) over the next four years in order to win nuclear certification not later than August 1986, 30 days before the IOC date. I scheduled the next POG meeting for about a month later, telling them that we would put together a comprehensive, integrated plan at that meeting.

Challenges and Responses

I faced seven challenges critical to success. In one form or another, leaders in "manage-and-lead-through-influence" situations will face similar problems. For each one, I describe my response in terms of the actions I took to meet it. Although these challenges and my responses were not necessarily caused by the lack of hierarchical



authority, the need to exert influence without direct authority certainly shaped both.

Challenge No. 1: Securing Commitment

From the beginning, I knew I had to obtain commitment to the goal of a nuclear-certified B-1B weapon system from all 14 organizations comprising the POG, as well as its 60 members. Securing that commitment was the key to attaining the cooperation needed to complete the work and reach the goal. Without that commitment, I knew we would fail, so I put a great deal of focus and priority into getting and maintaining it.

I had a great deal in my favor because the B-1B program enjoyed the highest national priority. People inside the SPO were excited to be working on it, as were the people from outside organizations. I built on that excitement with a campaign to educate POG members on nuclear certification as well as their leadership inside and outside the SPO. However, I intended that my campaign go well beyond education by designing it to persuade everyone involved that, for the B-1B to reach IOC, nuclear certification was not an option but an imperative. I began that campaign with General Thurman and the leadership in the B-1B SPO, carried it to the POG, and then engaged the management chains in the nine outside agencies. Thus, I successfully sold the requirement and obtained the needed commitment. But I did not simply declare success and go on to something else. Instead, I worked continually to maintain the commitment. For example, about a year after we started, I persuaded General Thurman to chair a one-day review by senior leadership of the plan, status, issues, and key ongoing actions. Leaders from the SPO and all nine outside agencies participated, approved the POG's agenda, and recommitted their agencies' support to the program and plan.

Challenge No. 2: Taking Charge

The need for a leader to step forward and take charge becomes even more important in the absence of hierarchical authority. Without leadership to drive the team, there will be no teamwork or coordinated, cohesive effort by individuals leading to real progress toward the goal.

Although I lacked hierarchical authority, General Thurman gave me all the authority I needed within the SPO by designating me the project leader and by directing the functional offices to support me and the project. Similarly, the B-1B contractors viewed me as a key customer and followed my direction and tasking. Outside the SPO and its two contractors, the remaining seven organizations had responsibilities in their regulations that dictated their roles and responsibilities in support of nuclear certification. Consequently, both inside and outside the SPO, I had all the authority I needed to exert influence. Although indirect and derived, the authority was still more than sufficient. Nevertheless, as I engaged the members of the POG individually before my first POG meeting, I left no doubt in their minds that I was taking charge and assuming responsibility for the project and expected their support. Not surprisingly, not only did I meet no resistance but also the team seemed relieved that someone was assuming control because they knew that without leadership, they would fail.

At the first POG meeting, I went well beyond just chairing the meeting by reinforcing the fact that I had authority. For example, I told the POG that we had four years to get the job done and that business as usual would not get us there. I emphasized that when we encountered problems, I was interested only in what we needed to do to solve them—not in how tough it would be to do so. Finally, I told them it was time to stop talking about what we needed to do and to start doing those things.

Challenge No. 3: Obtaining Cooperation and Teamwork

Securing commitment is essential but not sufficient for a project such as nuclear certification, which demands cooperation and teamwork across so many organizational boundaries. No simple formula exists for getting the necessary degree of cooperation and teamwork, but I believe that the following are key steps.

First, the leader must define what needs to be done, as well what the roles and responsibilities are, in sufficient detail that it becomes clear that the support of multiple organizations is critical to carrying out each task. I insisted that both the POG and its subgroup charters have this level of detail. Once we had the plan, every task had not only a designated office of primary responsibility but also offices of collateral responsibility. When teams recognize that cooperation and teamwork are imperative, the members will respond by working together.

Second, smaller groups tend to be more effective than larger ones in fostering cooperation and teamwork toward a common goal, so I delegated most of the work to the three subgroups, empowering them, as teams, to do the job. At every POG meeting, I had each POG subgroup chairman report on his organization's actions, results, progress, and issues. After only one or two meetings, the subgroups knew that I could tell the difference between activity and action, and that I expected both results and progress. Because people want to do a good job and satisfy their leaders, after I made my expectations clear and told them I would inspect their progress regularly, I got what I needed—teamwork, cooperation, and, most important, results and progress!

At that first POG meeting I attended, I did something that, in a very direct and powerful way, reinforced this message. As we went through the action items from the first couple of POG meetings held before my arrival, I closed 20 of the 30 items

because they tasked organizations to do their jobs or to coordinate with others in doing their jobs. I made it very explicit that I didn't need action items to have them do their jobs and coordinate—I expected them to do that! At each subsequent meeting, I focused action items on issues that needed resolution in order to keep the project on schedule.

Challenge No. 4: Opening the Lines of Communication

After securing commitment to reaching the goal and working together to do so, the leader faces yet another challenge: opening lines of communication among all organizations at all levels. My approach to this issue involved providing every POG member the telephone number and mailing address of all the other members. If we had had e-mail back in the early 1980s, I would have provided that also. The standard operating mode for nuclear-certification POGs at that time called for all communication to go through the SPO or POG leadership, especially if the communication involved interacting with or asking a program contractor for something. I knew that I had neither the staff nor the time to manage communications, so I authorized and encouraged every POG member to communicate directly with each other, including our contractors. This rather revolutionary approach carried a degree of risk because it could have led to substantive, unauthorized contract changes resulting in unplanned costs; nevertheless, I accepted that risk because I viewed open communications as essential and trusted our contractors—another somewhat unprecedented approach. However, before I implemented this initiative, I engaged our contractors, who operated on fixed-price contracts. I asked them never to say no to a request for anything without consulting me. If the request fell outside the scope of the contract, I told them that I would have the request or contract modified. In-



terestingly, I never received an “out-of-contract-scope” claim from them after I fixed the contract disconnects.

Looking back to the early 1980s, we see that communication itself presented a challenge because there were no computers, Internet, or e-mail, as well as no videoconferencing or teleconferencing capabilities. All communication took place either face-to-face or by phone. So we spent considerable time managing by walking around, talking on the phone, and traveling to meetings. Although those modes are somewhat inefficient, they benefited communication clarity and management effectiveness.

Challenge No. 5: Building Trust and Respect

Nothing is more important to effective teamwork than building trust and respect. For that reason, I focused a great deal of at-

their people’s performance reports, I provided written and verbal input to those reports. I built up additional trust and respect by writing a number of award nominations for their people.

Two illustrations reflect my efforts to build trust and respect in outside agencies. Traditionally, the operational user (SAC in this case) and the acquisition organization have a strained relationship. Users get frustrated because they feel that their requirements are not being fully met or because cost overruns and schedule delays occur. Acquisition agencies get frustrated because of requirement changes that affect design, cost, and schedule. Because the B-1B had a very detailed and rigorous requirements baseline, many of these traditional problems were mitigated up front. General Thurman also made SAC a voting member on the pro-

**Nothing is more important to effective
teamwork than building trust and respect.**

tion on this area, as illustrated by the following examples.

First, within the SPO, I worked out a couple of staffing rules with the functional offices. I insisted that they appoint to my project a chief functional-area expert who would accept responsibility for providing functional support and respond to my tasking. I made clear that, beyond supplying a chief functional expert, staffing my project and other projects was their responsibility and that I cared only about completing the job. I asked them to consult me whenever a conflict arose over meeting their multiple staffing responsibilities, assuring them that we would negotiate a solution. Although I didn’t sign

gram’s configuration and baseline-control board. I emulated that arrangement in the POG by making SAC a full member. If the command wanted something in the weapons-capability area, I never used the program baseline as an excuse to say no. Instead, I had our contractors evaluate the request. If they could accommodate it without affecting either the cost or schedule, we incorporated the change. If the request did affect either the cost or schedule, we gave SAC the option of offering an offset or elevating the proposed change to the program configuration and baseline-control board. In this way, we built trust and respect, accommodated many no-

impact changes, and, to my knowledge, never elevated a proposed change.

The second example involved the Air Force IG's DNS, who normally is not a member of the POG in order to preserve his independence. Traditionally, the DNS received the minutes of POG meetings, attended occasional meetings as an observer, and waited until near the end of the development phase to begin an independent assessment of the nuclear-safety study and proposed safety rules. This approach simply would not have worked with the B-1B because production had begun concurrently with development—an example of what I meant when I said that business as usual would not suffice. I asked the DNS representative to become an involved observer, requesting that he attend all POG meetings and make his concerns and is-

wrote a two-page trip report that went up the Air Force's IG chain. Condensed into a short paragraph inserted in the IG's weekly activity report to the secretary of the Air Force, the report quoted Lieutenant Colonel Shulstad as saying the B-1B would not reach its September 1986 IOC because it could not attain nuclear certification in time. The condensed form did not mention my statement that we would not be doing business as usual. About a week later, General Thurman was blindsided by the secretary of the Air Force during a B-1B program review. Being responsible for blindsiding the boss is one of the quickest ways to end a career, but I survived when General Thurman heard and validated the whole story; afterward, the Air Force IG apologized to the secretary and General Thurman for the misinformation. He even let me

Every project encounters problems or barriers that must be resolved or overcome to move forward and achieve success.

sues known up front so that we could address them and, hopefully, avoid costly design changes downstream. I even took the unprecedented step of inviting him to attend some program engineering-design reviews. I assured him that I understood and respected his need for independence and that I knew we had no guarantees that DNS would not find a design flaw later during its independent assessment of the safety study.

Opening up the POG for DNS participation and commenting that a business-as-usual approach would not assure B-1B nuclear certification in time for the September 1986 IOC came back to haunt me. After my first POG meeting, the DNS representative

retain the DNS as an involved observer in the POG after I worked out some rules with the directorate that would prevent any recurrence of such miscommunication. As painful as this incident was at the time, it contributed to building mutual trust and respect.

Challenge No. 6: Removing Barriers

Every project encounters problems or barriers that must be resolved or overcome to move forward and achieve success. Identifying these issues and working to resolve them can prove especially difficult when multiple agencies are involved and hierarchical authority is absent.



Almost immediately I realized that I had to fix the contractual disconnects to assure that we got the required level of support. Compounding this challenge was the fact that many of the players who negotiated the initial contracts on both the government and contractor sides had moved to other jobs. I did know, however, that both sides claimed that nuclear certification had been eliminated from the baseline contracts because of its cost—an estimated \$50 million.

Thanks to the planning effort discussed above, I had a good idea of what we needed the contractors to do. Armed with that knowledge, Rick Mael and I began a painstakingly detailed fact-finding analysis of the baseline contract and contractor proposals for nuclear certification. With the help of the contractors and SPO functional teammates, we found that most, but not all, critical analyses and tests were already in the baseline contract but not labeled nuclear certification per se. We also found that most of the government's \$50 million cost estimate was driven by the assumed necessity of the dedicated flight testing of weapons. We worked with the flight-test community to integrate both captive-carry instrumented environmental testing of weapons and flight testing of weapons delivery into the overall B-1B flight-test program. We did find that contractor support and participation in the POG and its subgroups had been eliminated from the baseline contract and needed to be covered. In the end, we negotiated contract changes with Rockwell and Boeing at a total cost of less than \$5 million. After our briefing, General Thurman directed that program-management reserve funds cover the \$5 million. The B-1B baseline now explicitly incorporated nuclear certification.

Challenge No. 7: Building and Executing the Plan

Building a comprehensive plan for a program requiring support from a number of

organizations is critically important and especially challenging without hierarchical authority. The key to meeting this problem is implementing a participative planning approach that sets top-level milestones and then delegates detailed planning to the level of execution. At that level, participants complete detailed planning by using a collaborative process involving all organizations. At my first POG meeting, I set time aside for the subgroups to begin the detailed planning process based on a few top-level milestones. I asked that they meet prior to my second meeting a month later, when we examined and integrated all the required activities, assigned responsibilities, and determined the necessary time phasing. We identified critical actions in both the lower-level subgroup plan and the top-level management schedule. Everyone left that second meeting with a clear understanding of what had to be done, by whom, with whose help, and by when.

I then shifted into a manage “performance-to-the-plan” mode with monthly reviews of subgroup progress and quarterly reviews at the POG meetings. During these reviews, we made adjustments as necessary, identified issues, and assigned action items to resolve the issues and get back on plan. Essentially, I used the plan to exercise control and direct management functions, an important enabler when managing through influence! My replacement and the POG continued to use the plan in this way after I departed for a new assignment in 1984; thus, the plan and my overall approach survived a change of leadership about halfway through execution.

Golden Nuggets

My responses to the seven challenges reflect both my strategy and leadership style that I used to direct the B-1B nuclear-certification program. They also reflect an overarching commitment to mission accomplishment and ability to adapt leadership and management style to meet the practical

challenges of the complex situation I faced. I had no prior experience in leading and managing through influence, yet the issues were clear from the beginning, and the basic framework of the strategy came together soon thereafter. The lessons I learned during planning and execution are reflected in my responses. Others can use my lessons learned and approaches in any managing-and-leading-through-influence environment. In generalized form, the following golden nuggets represent these best practices:

1. Secure and maintain commitment through education and persuasion of all management layers in all organizations.
2. Take charge through indirect, derived sources of authority and exert influence.
3. Obtain cooperation and teamwork by defining roles and responsibilities and making expectations clear regarding the need for action and progress.
4. Open the lines of communication by enabling all teammates to communicate with each other.
5. Build trust and respect through open, frank engagement and actions.
6. Remove barriers to success with determined collaborative effort, hard work, and negotiation when necessary.
7. Build and execute a comprehensive plan and use it to exercise direction and control.

Keys to Success

In addition to applying the golden nuggets, individuals who wish to be successful

in this complex environment must practice sound management and effective leadership. They must apply the basic management functions of organizing, planning, directing, and controlling, but skills in persuasion and negotiation become more important in the absence of hierarchical authority.

Similarly, my responses to the challenges discussed here reflect almost all of what I consider the essential elements of effective leadership: caring about people, setting the vision and direction, communicating effectively, embracing and instilling a positive attitude, staying proactive, and mentoring and developing subordinates—even those who don't work directly for the leader.¹⁰ However, the involvement of multiple agencies requires a more collegial, participative leadership style.

Although the golden nuggets, management, and leadership are all important for success, in the end the hard work of dedicated, talented, and empowered people makes the critical difference. I was very fortunate to have such a team on the B-1B nuclear-certification program.*

Summary

Managing a program or campaign that includes multiple organizations without hierarchical authority demands a management-and-leadership-through-influence approach. By examining a case study, I have identified the best practices that can enable success in this kind of challenging environment. I hope that others will benefit from what I learned and can apply that knowledge to become more effective managers and leaders in these kinds of complex environments. 🌟

*I want to acknowledge the key members of the B-1B nuclear-certification team, whose dedication and hard work were instrumental to the success we enjoyed: Earl Kelley (my successor in the B-1B SPO); Johnny Davis (B-1B SPO Safety); Tom Roth, Ken Nelms, Jon Lowe, and Danny Lykins (B-1B SPO Engineering); Joe Hoerter (B-1B SPO Test); Jim Rau (B-1B Logistics); Chuck Witmack and Lynn Gulick (Rockwell); Hal Groves (Boeing); Phil Gannon (Air Force Flight Test Center); Bill Skadow (Air Force Inspector General / Directorate of Nuclear Surety); and Don Gluvna (Sandia Labs).



Notes

1. Dr. Raymond A. Shulstad, Brigadier General, USAF, Retired, "Perspectives on Leadership and Management," *Air and Space Power Journal* 23, no. 2 (Summer 2009): 11–18, <http://www.airpower.au.af.mil/airchronicles/apj/apj09/sum09/sum09.pdf>.

2. I asked Rick Mael to collaborate with me on this article because of his unique perspective derived from being the only person in the B-1B SPO who actually worked directly for me. Rick has remained a professional colleague and close personal friend for the 28 years that have passed since I took charge of the B-1B nuclear-certification program. I knew that I needed his help in getting the facts right after all this time and that his perspective as a trusted and respected subordinate would prove invaluable to balancing my views as a senior leader.

3. Boeing's B-1B offensive avionics leveraged the B-52 avionics-modernization program accomplished as part of integrating air launched cruise missiles (ALCM) into the B-52. Similarly AIL's B-1B defensive avionics leveraged the significant flight testing of defensive systems on the B-1.

4. The initial baseline of \$19.7 billion included both a conventional bomb capability and a nuclear weapon (bombs and short-range air-to-surface attack missiles) capability. Soon after the awarding of initial contracts, \$800 million was added to the baseline for integration of the ALCM, giving the B-1B a standoff nuclear-delivery capability.

5. The major exception to moderate risk was the defensive avionics suite, something very technically challenging from the beginning. This risk was somewhat mitigated by incrementally enhancing the defensive suite during aircraft production and by adding the ALCM, which provided a standoff capability that would not require the B-1B to penetrate enemy defenses.

6. This model of having the government assume responsibility for integration was unprecedented in aircraft acquisition programs; however, it had been successfully used for many years in intercontinental ballistic missile programs, in which an engineering-support contractor—TRW—performed that role for the government.

7. Maj Richard D. Mael, "B-1B: An Untold Success Story," research paper (Norfolk, VA: Armed Forces Staff College, 12 November 1986).

8. Nuclear certification is governed by Department of Defense Directive 3150.2, *DoD Nuclear Weapon System Safety Program*, 23 December 1996, sec. 4, "Policy," <http://www.dtic.mil/whs/directives/corres/pdf/315002p.pdf>.

9. Within the Air Force, the IG's DNS, in order to preserve its independence, participates in the POG as an observer rather than a member.

10. Shulstad, "Perspectives on Leadership and Management," 13–15.

**Dr. Raymond A. Shulstad, Brigadier General, USAF, Retired**

Dr. Shulstad (BS, University of Alabama; MS, PhD, Air Force Institute of Technology) is an independent consultant to industry and government for a broad range of topics, including organizational management and leadership, research and development, and systems engineering and acquisition. In 2006 he retired as the senior vice president and general manager of MITRE's Center for Air Force Command and Control Systems. Prior to joining MITRE in 1999, he was the director of Strategic Planning for Surveillance and Battle Management Systems for Northrop Grumman Corporation. General Shulstad retired from the Air Force in 1994 after a distinguished 28-year career. His final assignments included vice-commander of the Aeronautical System Center at Wright-Patterson AFB, Ohio (1993–94), and vice-commander of the Electronic Systems Division, Hanscom AFB, Massachusetts (1991–93). His publications include *Peace Is My Profession* (National Defense University Press, 1986), a book that deals with the moral dimensions of US nuclear policy.

The Art of Persuasion

Capt Lori Katowich, USAF, Editor

Throughout its history, *Air and Space Power Journal* (ASPJ) has published a wide variety of articles—some relatively benign, others quite controversial. All of our authors, however, seek to persuade. Starting with an idea important to them, they attempt to convey its significance to ASPJ's readership, with varying results. Many readers have already made up their minds about a volatile subject regardless of an article's treatment of it, but some may have no knowledge whatsoever of the topic at hand. As a prospective author, you may have thoughts to share on a particular subject but don't know where to start. Consider the following elements.

Know your audience. Craft your writing with the audience in mind. Not limited to members of the US Air Force, ASPJ's diverse readership includes people in the Department of Defense, other government agencies, and academe, as well as their counterparts in foreign countries. All of them bring their own biases and understanding to the *Journal*. There is no "right" presentation, yet the words you choose are important.

Use straightforward language. For the sake of efficiency, homogeneous groups tend to develop their own operating language, which, for example, may include abbreviations and acronyms that have no meaning, or a completely different meaning, in other contexts. By minimizing or simply explaining unique terms, you make your article more accessible. Straightforward language need not be boring or simplistic; neither is it necessarily condensed. The two acceptable *biweekly*—twice a week or every two weeks—illustrate the importance of using straightforward, precise language to reduce ambiguity and increase the chances that readers will understand your message.

Consider alternate views and then focus your position. Simply put, do your research. Our most successful authors base their articles on thorough research, taking into consideration many sides of an argument. Without such consideration, any attempt to persuade becomes only a rant. Viewing a topic from many angles lends support to your position and enhances your understanding of interpretations that may starkly contrast with your own. You may even discover a better outcome than your initial assumption. By addressing opposing positions, you strengthen your credibility. Furthermore, careful consideration conveys to readers that you do not write instinctively or impulsively but that you proceed from a firm foundation, arriving at your conclusion by means of a logical progression based on fact. Not all readers will agree with you, and many may think that you simply lack a clear grasp of the situation. Exhaustive research will temper that view.

Don't antagonize the opposition. Rather than addressing philosophical allies, target readers who are neutral or even hostile to your thesis. However, be aware that an overly aggressive approach will repulse the ones you want to win over. After all, people under attack become defensive and fight back, ignoring your reasoning—regardless of its validity. Provoked readers, even those who come to your subject without strong opinions, may react by simply dismissing your remaining arguments. Passionate writing is fine, but uncontrolled passion can be divisive.

Use a logical approach to reach your conclusion. If you wish to win people to your way of thinking, they must *receive* the message—specifically, by recognizing and acknowledging your thesis. Effective ASPJ articles, which should address the operational



level of war, have followed a variety of structures: chronological, simple to complex, bottom to top, geographical, and so forth. In short, the organizational scheme should fit the subject and the argument. Following a chaotic article is much like chasing squirrels: much effort rewarded by little sustenance. People are busy. If they have to work to follow your thinking, many will put their time to better use.

So what? You've laid out the facts, analyzed them, and led your audience to a conclusion. Or have you? If you haven't answered the question "so what?" do so now. In the conclusion, show your readers how the salient points coalesce. Do not make the mistake of introducing new material here;

doing so relegates the new information to filler and may damage your credibility. Offer a substantive recommendation, not something nebulous and essentially useless: "We should study this further." If you've presented alternative outcomes, pick one and support your conclusion. Do the facts call for implementation of a new program? By whom? What would you do if you were "general for a day"?

Finally, give your article a title, but not one of executive-summary length. Aim for 10 or fewer words. An eye-catching title can persuade the audience to keep reading.

We look forward to receiving your submissions. ✪

AIR & SPACE
POWER JOURNAL

Free Electronic Subscriptions

You can subscribe to the online versions of all six *Air and Space Power Journal* language editions at <http://www.af.mil/subscribe>.

We will then send you quarterly e-mail messages with links to the articles in each new issue.

We encourage you to e-mail your comments to us at aspj@maxwell.af.mil. We reserve the right to edit your remarks.

CHINA'S PERSPECTIVE ON NUCLEAR DETERRENCE

With great interest, I read the article “China’s Perspective on Nuclear Deterrence” by Sr Col Yao Yunzhu of the People’s Liberation Army (PLA) of China (Winter 2009, *Air and Space Power Journal-Chinese*; Spring 2010, *Air and Space Power Journal-English*). Researching Colonel Yao on the Internet, I learned that she was the first PLA servicewoman to earn a doctor’s degree in military science. When the published version of her doctoral dissertation “Post-World War II US Deterrence Theory and Policies” appeared, it reportedly represented the most comprehensive analysis within China about US nuclear strategy and deterrence theory.

I consider many of her statements in “China’s Perspective on Nuclear Deterrence” quite important—for example, “Chinese leaders mainly consider nuclear weapons a political instrument for employment at the level of grand strategy, not as a winning tool for military operations” (*ASPJ-English*, p. 28) and “the basic logic of China’s nuclear thinking conceives of nuclear weapons as a deterring, not a winning, instrument against other such weapons” (*ASPJ-English*, p. 29).

As a reader concerned with China’s core interests, I highly appreciate *ASPJ*’s publishing an article by an authentic Chinese strategist who explains her military’s strategy of nuclear deterrence. Reprinting this article in the other language editions of *ASPJ* would help disseminate China’s true nuclear perspective and policies, as well as its big-power considerations regarding integrity and responsibilities. Furthermore, doing so would help drive the discussion about the so-called Chinese threat back onto the track of rational and informed debate.

Hui Hai
Jiangsu, China

HYBRID WARFARE AND IRREGULAR WARFARE

I would like to commend the Honorable Robert Wilkie and Col John Jogerst, USAF, retired, for their excellent, thought-provoking articles on hybrid warfare (“Hybrid Warfare: Something Old, Not Something New,” Winter 2009) and irregular warfare (“Preparing for Irregular Warfare: The Future Ain’t What It Used to Be,” Winter 2009), respectively. In response to the shift from conventional warfare to hybrid warfare and irregular warfare, both authors argue for the need to improve the Air Force’s conventional capabilities in support of counterinsurgency (COIN). Although, as Jogerst observes, the value of airpower in COIN is indisputable, the Air Force continues to struggle in communicating its role and contribution to the joint fight in COIN. I agree with them and recognize the Air Force’s communication struggle, but I am deeply concerned that focusing on airpower’s contribution to COIN will further divert national attention from strategies involving the use of airpower to achieve national objectives at much lower costs.

Specifically, I have come to believe that the national military strategy for the global war on terror is fundamentally flawed and should be challenged and revised. That strategy today, as embodied in Iraq and Afghanistan, requires invading, occupying, stabilizing, and attempting to democratize nations that threaten our national interest by supporting terrorism, seeking weapons of mass destruction, and so forth. This strategy requires the United States to deploy large numbers of ground forces to conduct COIN operations until the host nation can carry the fight. As we have painfully learned, this takes many years—probably decades. It also requires the United States to support corrupt governments viewed as US puppets that do not have the kind of public



support needed for long-term, democratic self-governance. Of course, it has also fueled hatred toward the United States in the Muslim world, resulting in an ever-increasing level of terrorism against us and our allies. I don't understand how we forgot the lessons of Vietnam or of Russia in Afghanistan. Now that the United States has spent more than eight years of failing to attain its objectives with this strategy, I was hoping that, rather than just focusing on how many more troops on the ground are necessary for COIN to succeed in Afghanistan, the president would concentrate on the strategy itself. However, I was disappointed.

I am especially disappointed that we continue to ignore strategy options that would exploit the decisiveness of airpower. For example, almost immediately after the 1986 air strike against Libya, Mu'ammarr Gadhafi stopped his open sponsorship of terrorism, later renouncing it completely and giving up his ambitions to obtain nuclear weapons. I believe that such a strategy could have been equally effective in Iraq. For example, if we had put two or three cruise missiles on each of Saddam Hussein's more than 20 palaces, couldn't we have realized our objective of toppling him or persuading him to prove that Iraq had destroyed all of its weapons of mass destruction? Isn't there a chance that this strategy could have worked in Iraq and saved us hundreds of billions of dollars, eight years of wearing out our troops on the ground in fruitless COIN operations, and—most importantly—the lives of thousands of brave, patriotic young Americans? Under this option, we would not have to struggle to defend the value of airpower—it would be obvious, as it was in Libya in 1986 and in Operation Desert Storm a few years later.

A number of high-level defense reviews are being conducted in parallel, but I have heard nothing to suggest that we are undertaking a fresh, objective look at US national military policy and strategy. I hope I am wrong because staying the present course will take decades, cost hundreds of billions of dollars, result in the deaths of many

young Americans, and—worst of all—more than likely fail. Changing course in no way implies that we have to lose the war on terror. For example, what if we invested a small fraction of the hundreds of billions of dollars saved in improving our access to actionable, targetable intelligence? Then, as we have started doing in Pakistan, what if we used US airpower to kill those targets until the nations involved become proactive and aggressive in killing them?

I know that these are complex, challenging times for our military and that there are no easy solutions. I also know that it is important for the Air Force to support the joint fight. But the Air Force has capabilities that, from a national perspective, may be more important than simply supporting COIN. We need to consider those capabilities in developing options for our national military strategy.

Brig Gen Raymond A. Shulstad, USAF, Retired
Land O' Lakes, Florida

CYBERSPACE LEADERSHIP

Gen Giulio Douhet once eloquently noted that “victory smiles upon those who anticipate changes in the character of war, not upon those who wait to adapt themselves after the changes have occurred.” In “Cyberspace Leadership: Towards New Culture, Conduct, and Capabilities” (Fall 2009), Gen Kevin Chilton writes that “the global cyberspace domain is where information is moved today” (p. 6). Surveying the annals of history, he then discusses the culture, conduct, and capabilities that formerly or currently exist in the US military, drawing parallels between those and the future of cyberspace leadership. According to General Chilton,

If, as the adage states, the past truly is prologue, a look back at lessons learned in the early days of military aviation may provide a compelling paradigm for developing cyberspace capabilities needed to address the challenges of today and tomorrow. How did we develop the capabilities of airpower for national security needs? What did we do right?

What did we do wrong? And—the real question for today—how can we apply those lessons learned in the field of airpower to our development of cyber power? (p. 6).

We certainly must learn the lessons of history (or be doomed to repeat them). However, the Air Force's cyber "speak" seems more like a review or recitation of history than innovative application of the wisdom and judgment of the air and space experts we claim to be. In a figurative sense, we are using rulers to measure the future of the cyberspace domain and a chalkboard to draw a picture of what lies ahead. For example, General Chilton mentioned that it took him 45 days to determine the number of computers on our networks. Is this really the vital piece of information that our strategic leadership requires to blaze a trail into the wild blue cyberspace yonder? Similarly, I recently heard a highly respected flight-test professional—an engineering expert with countless years of service—remark, "Let so and so know that you are using a design of experiments [a type of statistical tool] in your planning, because we are tracking how often we use statistical tools." Instead of using tools effectively to get the job done, we are counting how many times we use them. We are leveraging our tremendous cyber capability to count things; Google does that much better than we can. We have failed to maximize the potential of cyberspace for global-information reach and information-power projection; Twitter, YouTube, and Facebook do that much better than we can.

We may not know what the cyberspace future holds, but we should realize what it is not. Cyberspace is not a high-definition picture of the battlespace on a big-screen television—we tend to lose sight of the forest for the trees. Nor is it 200,000 hits on an Internet search engine. Information and cyberspace supremacy will not occur be-

cause we have *all* of the information, so let's stop trying to count, measure, and file all of it. The hyperfocused, hyperlethal, effects-based cyberspace weapon of the future is the right piece of information at the right time. This is the lesson we need to learn and the future we need to envision.

Maj Mark H. Jones Jr.
Edwards AFB, California

LEADERSHIP BY THE SOCRATIC METHOD

Maj Aaron Tucker's article "Leadership by the Socratic Method" (Summer 2007) is very well written and informative. As an Army aviator with 25 years of service, I found it timely and very much on target. The Socratic method works well with adult learners. When considering the traits of an adult learner (motivation, experience, degree of engagement, and application of the learned skill), we can see that this method fits nicely with these characteristics by actively engaging the student in the learning process. During flight instruction by either an actual instructor or aircraft commander, the Socratic method has the learner asking questions in addition to displaying ability and skill. As Major Tucker mentions, "The student quickly learns that the instructor is there not to lecture (and unnecessarily increase the workload) but to serve as a sounding board for the student's ideas and actions" (p. 83). This process, combined with traditional ground-school lectures, constitutes a well-rounded and effective method of delivering information that enables students to absorb instruction and learn by repetition, enforcement, and active participation. Please pass on my appreciation to the author.

CW4 Brian J. Martin, US Army Reserve
Johns Hopkins University

Should the United States Maintain the Nuclear Triad?

Dr. Adam B. Lowther*

In the first week of Pres. Barack Obama's new administration, the White House released his agenda, stating the policies the president will pursue regarding the nuclear arsenal. The agenda includes three foci: securing loose nuclear material from terrorists, strengthening the Nuclear Non-Proliferation Treaty, and moving toward a nuclear-free world.¹ Pushing the president in the direction of a "world without nuclear weapons" are such paragons of past political power as former senator Sam Nunn and former secretaries of state George Shultz and Henry Kissinger.² Adding a host of Washington's think-tank analysts to this list produces a crescendo of voices calling for "global zero." They challenge not only the current size of the arsenal but also the very need for a nuclear triad. Much of the recent scholarship shows a clear preference for moving to a monad composed solely of submarines armed with submarine-launched ballistic missiles (SLBM) until the United States ultimately disarms.³

Some past and present members of the military leadership hold a view that supports the nuclear arsenal. Senior leaders have given a number of public speeches and interviews outlining what it will take to maintain and modernize the most advanced and secure nuclear arsenal in the world.⁴ A key aspect of the general position held by supporters of the arsenal includes retaining the triad and replacing aging platforms.

In the ongoing debate over the appropriate size and purpose of the nuclear arsenal, abolitionists—clearly in the ascendancy—make six basic arguments that would ulti-

mately lead to creation of a nuclear monad before reaching total disarmament:⁵

1. Post-Cold War presidents have failed to alter nuclear policy for the current security environment.
2. Terrorism, not Russia, is the primary threat facing the United States. Nuclear weapons do not deter terrorists.
3. America's advanced conventional capabilities can accomplish the same objectives as nuclear weapons.
4. As a signer of the Nuclear Non-Proliferation Treaty, the United States must move toward nuclear abolition.
5. Only nuclear disarmament can overcome the threats of accidental detonation, miscalculation leading to nuclear war, and proliferation of nuclear weapons and material.
6. The safest and most secure leg of the nuclear triad is the sea-based one. Thus, it should become the sole delivery platform for the nuclear arsenal.⁶

Admittedly, each of these arguments has some element of truth; they do not, however, represent a complete understanding of the strategic role played by nuclear weapons in ensuring the sovereignty of the United States or the specific contribution of each leg of the triad. Although each of the abolitionists' arguments deserves a detailed refutation, a focus on the relevance of the triad must suffice.

*The author is a military defense analyst with the Air Force Research Institute, Maxwell AFB, Alabama.

Development of the Triad

In 1947, the year the United States Air Force became an independent service, the American military was attempting to develop sound tactical, operational, and strategic doctrine for the use of nuclear weapons. Just two years earlier, a new and devastating weapon had changed the face of warfare, but the full implications of the atom bomb were yet to be realized. In a flurry of activity, the academic, military, and policy communities undertook much writing and studying as the nation sought to understand nuclear weapons while also confronting the Soviet Union. As technology developed over the following decades, the nation moved from depending on a fleet of long-range bombers as the sole method of delivering nuclear weapons (1945–59) to a nuclear triad composed of bombers, intercontinental ballistic missiles (ICBM), and SLBMs.⁷

During the 1950s, Pres. Dwight Eisenhower believed that an American effort to maintain conventional parity with the Soviet Union would destroy the US economy and bankrupt the federal treasury.⁸ Thus, his administration turned to the nuclear arsenal as a substitute for conventional parity. In the president's view, the United States could effectively deter Soviet aggression by placing greater emphasis on nuclear weapons in American national security policy. Commonly called the "New Look," the president's emphasis on the growth of advanced nuclear weapons and delivery platforms led to development of a large fleet of nuclear bombers and, by the end of the Eisenhower administration, the nuclear triad.⁹ Composed of three legs, the triad provides the United States with three distinct delivery platforms for nuclear weapons.

The first and oldest leg includes the nation's long-range bombers and their payload of gravity bombs and air launched cruise missiles. At its apex in the early to mid-1960s, Strategic Air Command included more than 1,300 nuclear-capable bombers, including 700 of the then-new B-52s.¹⁰ By 1990 the nation's long-range bomber fleet

had declined to 347 total aircraft.¹¹ Today, nuclear-capable bombers account for about half of the Air Force's bomber fleet of 162 aircraft.¹²

A second leg became part of the nation's nuclear arsenal in 1959 with deployment of the first six Atlas D ICBMs. Just three years later, the first Minuteman I deployed. Not until 1970 did America's ICBM force reach its peak with a mix of 1,054 Titan II and Minuteman I, II, and III missiles—some of which carried multiple warheads. These numbers remained constant until 1982.¹³ Since then, the number of operationally deployed ICBMs has steadily declined to its current size of 450.¹⁴

The addition of the Polaris SLBM in 1960 completed the triad. Like the other two legs, SLBMs waxed at the height of the Cold War and waned as it ended. By 1967 the United States had deployed 656 SLBMs aboard 41 ballistic missile submarines (SSBN). When the Soviet Union collapsed in December 1991, the sea leg of the triad remained largely intact with 33 SSBNs carrying 608 SLBMs.¹⁵ Today, however, only 14 *Ohio*-class submarines remain, each carrying 24 Trident II nuclear missiles.

Throughout the Cold War, the United States maintained a substantial inferiority in conventional military forces but enjoyed the protection of a sizable nuclear umbrella. As the Cold War progressed and American thinking about nuclear conflict developed, "assured destruction" took precedence as the approach of choice. Developed by Thomas Schelling and others while he worked for the RAND Corporation in the 1960s, the concept of assured destruction purposefully left the United States vulnerable to a first strike, yet the nation maintained a credible second-strike capability.¹⁶ Although nuclear policy evolved throughout the Cold War, its essential nature remained much the same. Because of the exorbitant fiscal cost of building a large underground industrial infrastructure, for example, the nation chose to accept the risk of an unprotected public—but only as long as it was defended by bombers standing at

alert, ICBMs protected in their reinforced silos, and submarines quietly prowling the world's oceans. In the end, deterrence seems to have worked.

A second aspect of American nuclear policy—often overlooked in the current debate—dates back to the earliest days of the North Atlantic Treaty Organization (NATO) when the United States and its European allies made a conscious decision to forgo creation of a NATO military equal in strength to that of the Warsaw Pact. Instead, the European members of NATO chose to rely on America's strategic nuclear weapons—based in the United States and at sea—as well as tactical nuclear weapons, based in Europe, as a guarantor that Eastern Bloc troops would not roll through the Fulda Gap on their way to Paris.¹⁷ Extended deterrence, as it came to be known, enabled Western Europe to focus on economic development instead of heavy investment in national security. Although this type of deterrence often proved unpopular with European publics, governments throughout Western Europe depended upon the security provided by basing nuclear weapons throughout the West.

Entering the Post–Cold War Era

In the immediate aftermath of the Cold War, assured destruction and related nuclear strategies that had served the nation well for more than two generations were almost forgotten as the euphoria that engrossed America took hold.¹⁸ With it, the triad fell into decline. As the former Soviet Union sought to stabilize its deteriorating economy by lowering its military expenditures, the United States joined Russia in making dramatic reductions to the overall size of the nuclear arsenal. The “peace dividend” promised to the American people by presidents George H. W. Bush and Bill Clinton led to a refocusing of US foreign policy. With the Russian Bear focused on internal struggles, the United States was free to take on the role of global hegemon

and concentrate its efforts on serving as the world's policeman. The 1990s saw the US military intervene in a number of failing or failed states such as Somalia, Haiti, Bosnia, and Serbia, while also emphasizing democratization of the former Soviet Union and globalization of the international economy.¹⁹

As Francis Fukuyama suggested in his article “The End of History?” “What we may be witnessing is not just the end of the Cold War, or the passing of a particular period of postwar history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government.”²⁰ Democracy had apparently won; socialism had apparently lost. Continuing to focus on the nuclear triad and nuclear conflict seemed passé.

Between 1991 and 2009, the nuclear arsenal shrank by more than 75 percent. Few members of Congress or the military objected since it appeared that the single greatest purpose for nuclear weapons was gone. Even in the wake of the terrorist attacks of 11 September 2001, Pres. George W. Bush signed the Strategic Offensive Reduction Treaty, which obligates the United States and Russia to reduce their operationally deployed strategic weapons to between 1,700–2,200 each by 2012. President Obama is promising to follow suit and continue reductions in the nuclear arsenal as the United States eventually moves to zero.²¹

Although President Obama's speech of 5 April 2009 may give the impression that he has adopted the stance of nuclear abolitionists, one should not forget that Pres. Ronald Reagan once said that he “dream[ed]” of a “world free of nuclear weapons.”²² Just as Reagan shepherded the United States to victory in the Cold War, so, hopefully, will President Obama act responsibly and not put the national security of the United States at risk by reducing the nuclear arsenal to a point that nuclear deterrence loses the credibility that enables its success.

The Current Debate

In an era dominated by nonstate actors (terrorists, international criminal gangs, and insurgents), rogue regimes, and rising powers, some members of the Air Force are asking whether the triad is still relevant or whether nuclear abolitionists are correct in suggesting that the United States adopt a monad as the nation moves toward zero. The answers to these questions deserve considerable attention. In short, however, the triad is as relevant today as it was at the height of the Cold War. Nevertheless, before offering a justification for maintaining the triad, one should explain the position of nuclear abolitionists.

The Abolitionists' Position

According to the most recent reports and studies published by advocates of nuclear abolition, the United States should initiate complete disarmament by taking the following actions.²³ First, abolitionists desire to remove the 76 remaining B-52H and 19 B-2 bombers from nuclear-capable service.²⁴ By maintaining an arsenal of 500–1,000 warheads, as abolitionists suggest, the United States no longer needs the bomber leg of the triad. Additionally, the nation's long-range bombers are slow to reach their targets, cannot penetrate advanced anti-air defenses (with the exception of the B-2), and are expensive to procure and maintain.

Second, abolitionists seek to dismantle the nation's 450 ICBMs, which need expensive upgrades or replacement and present the nation's adversaries a target on American soil.

Third, abolitionists are willing to accept, for the near term, a nuclear deterrence strategy that relies solely on a dozen *Ohio*-class SSBNs (after downsizing from the present 14), each armed with 24 Trident II SLBMs.²⁵ According to their strategy, the United States will maintain half of its SSBNs at sea at any given time while the other half is in port at one of two designated submarine bases.

Abolitionists are willing to accept a submarine-based monad because they consider submarines the most secure leg of the triad. These vessels also obviate the need for operationally deployed nuclear weapons on US soil. Supposedly, the absence of these weapons would reduce the likelihood of a counterforce strike against the homeland.

Because these arguments seem reasonable and each contains an element of truth, they have wide appeal. But if the United States were to adopt a monad, the nation's ability to deter current and future adversaries would decline precipitously for four key reasons.

The Counterview

First, deterrence, the capstone of American foreign policy since the end of World War II, relies on effectively making an adversary believe that the risks involved in changing the status quo outweigh any potential rewards. To achieve effective deterrence, the United States must have the capability and, most importantly, credibility to create the desired psychological effect. Moving to a nuclear deterrence strategy that effectively depends on a half dozen deployed submarines undermines both capability and credibility. Contrary to the admonitions of abolitionists, adopting a monad sends a clear signal to America's adversaries that the nation does not value nuclear weapons to the degree it once did and will be more reluctant to use a diminished arsenal in the future. This emboldens adversaries and decreases the confidence that US allies have in the nation's extended deterrence.

Successful deterrence depends *completely* upon simply and effectively communicating desire and intent to allies and adversaries. Dramatically reducing the size of the arsenal and killing two legs of the triad, while claiming that the United States remains serious about nuclear deterrence, would send a mixed signal. The historical record does not offer analogous examples of arms reductions leading to the maintenance of credibility. On the contrary, the Washing-

ton Naval Treaty (1922), which limited the tonnage of major world navies, may have played a key role in leading the Japanese to attack Pearl Harbor.²⁶ Admittedly, such counterfactual claims are difficult to prove.

Second, since signaling intent is a vital aspect of successful deterrence, eliminating the bomber leg of the triad would be a mistake. Designed to remain hidden from the view of an adversary, ICBMs and SSBNs offer no effective way of conveying American resolve or an escalation/de-escalation in posture, should an adversary move toward conflict. The bomber fleet, however, effectively demonstrates resolve. For example, if an adversary were to openly challenge the status quo, the president could order the nation's B-52s and B-2s on alert, put them in the air, and/or deploy them to forward bases. All of these actions are visible signals

prove too costly for many potential proliferators. On the other hand, they increase risks for an adversary by driving him to a strategy (counterforce) requiring the elimination of American ICBMs in an effort to prevent a US counterstrike. Forcing an adversary to strike the United States in order to eliminate its nuclear arsenal serves as a strong deterrent when the enemy considers a nuclear attack. Moreover, these missiles are the only leg of the triad that can hit any spot on the earth within half an hour.

Fourth, should the United States adopt the plan advocated by abolitionists, the nation's adversaries would know full well that half the nuclear arsenal would be in port at any given time, vulnerable to destruction by a single nuclear missile targeting each of the two designated nuclear submarine

The United States may soon face a real scenario in which two nuclear missiles and a half dozen torpedoes can destroy the entire operationally deployed strategic nuclear arsenal—something no American should desire.

of American intent, designed to lead to a de-escalation of tensions. Without question, bombers are the most effective tool for overtly demonstrating resolve.

A related point arises. Nuclear-capable bombers are one of the best tools for assuring allies that the United States remains committed to providing a credible extended deterrent. Neither ICBMs nor submarines can provide a *visible* show of resolve in the face of danger. Deploying nuclear bombers to an ally's air base not only assures America's friends but also deters the nation's foes.

Third, ICBMs offer two distinct benefits that a submarine force cannot replicate. On the one hand, they raise the cost of entry into the nuclear club as a peer of the United States. ICBMs require expensive and advanced missile technology, which may

bases. Contrary to what Americans are led to believe, Russia and China maintain advanced submarine-detection capabilities that may enable either nation to detect, track, and sink the half of the nuclear arsenal (six submarines) at sea.²⁷ Moving to a submarine-based monad will also encourage adversaries of the United States to focus technological development on advanced sonar and torpedo technology. Doing so will simplify the calculation for an adversary seeking to neutralize the American arsenal.

The United States may soon face a real scenario in which two nuclear missiles and a half dozen torpedoes can destroy the entire operationally deployed strategic nuclear arsenal—something no American should desire. Redundancy, which the triad provides, offers a level of protection that a

submarine-based nuclear arsenal would greatly diminish.

Increasing American vulnerability and decreasing American capability do not represent a strategy for successful deterrence. As history demonstrates, deterrence works when the United States effectively convinces its adversaries that an attack on America will fail to carry out the desired objectives and will invoke massive retaliation. Any other approach to deterrence is doomed to failure.

Relying on what abolitionists refer to as “minimum deterrence” is a recipe for placing the American people at greater risk, not less.²⁸ Even though the United States will likely suffer a terrorist attack, it is certainly not the most dangerous threat the nation

faces. With the nuclear club expanding and likely to gain new members hostile to the United States, weakening the nuclear triad is unwise. Doing so not only will undermine American credibility but also will cause allies to doubt America's commitment to extended deterrence. This could lead allies to pursue their own nuclear arsenals as a hedge against American weakness and perceived threats yet to materialize.

Even though we Americans are generous, well-intentioned people, others do not necessarily wish us well. We would be wise to remember that fact. As the great Roman strategist Vegetius once wrote, “Si vis pacem para bellum” (If you desire peace, prepare for war). ♣

Maxwell AFB, Alabama

Notes

1. Barack Obama, “Remarks by President Barack Obama,” Office of the Press Secretary, The White House, 5 April 2009, http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered.

2. Ibid.; and George P. Shultz et al., “Toward a Nuclear-Free World,” *Wall Street Journal*, 15 January 2008, http://online.wsj.com/public/article_print/SB120036422673589947.html.

3. Ivo Daalder and Jan Lodol, “The Logic of Zero,” *Foreign Affairs* 87, no. 6 (November 2008): 80–95.

4. Gen Kevin P. Chilton (remarks to the Strategic Weapons in the 21st Century Conference, Ronald Reagan International Trade Center, Washington, DC, 31 January 2008); and Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, *Report of the Defense Science Board Task Force on Nuclear Deterrence Skills* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, September 2008).

5. Within the group broadly defined as nuclear abolitionists are a number of varying opinions. Some—such as Richard Branson and Queen Noor of Jordan, who ascribe to global zero—support a unilateral move by all nuclear powers to abolish nuclear weapons. Others, such as Henry Kissinger and George Shultz, believe that slow and steady reductions are the proper approach. All parties within the

abolitionist camp believe in nuclear abolition as a relevant and obtainable goal. See the Global Zero Web site, <http://www.globalzero.org>; and Barack Obama, “Remarks by the President at the United Nations Security Council Summit on Nuclear Non-Proliferation and Nuclear Disarmament,” Office of the Press Secretary, The White House, 24 September 2009, http://www.whitehouse.gov/the_press_office/Remarks-By-The-President-At-the-UN-Security-Council-Summit-On-Nuclear-Non-Proliferation-And-Nuclear-Disarmament.

6. For a detailed discussion of the arguments made by nuclear abolitionists, see Adam Lowther, *Challenging Nuclear Abolition*, Research Paper 2009-4 (Maxwell AFB, AL: Air Force Research Institute, August 2009), http://www.afa.org/EdOp/2010/Logic_of_Nuclear_Arsenal.pdf.

7. Douglas P. Lackey, *Moral Principles and Nuclear Weapons* (New York: Rowman and Littlefield, 1986), 43.

8. Douglas Kinnard, *President Eisenhower and Strategy Management: A Study in Defense Politics* (New York: Pergamon-Brassey's, 1989), 1–25.

9. Saki Dockrill, *Eisenhower's New-Look National Security Policy, 1953–61* (New York: St. Martin's Press, 1996), 48–62.

10. Rebecca Grant, *Return of the Bomber: The Future of Long-Range Strike*, Air Force Association

Special Report (Arlington, VA: Air Force Association, February 2007).

11. Natural Resources Defense Council, "Table of US Strategic Bomber Forces" (Washington, DC: Natural Resources Defense Council, 2002), <http://www.nrdc.org/nuclear/nudb/datab7.asp#ninety>.

12. "2009 USAF Almanac: The Air Force in Facts and Figures," *Air Force Magazine* 92, no. 5 (May 2009): 48.

13. Natural Resources Defense Council, "Table of US ICBM Forces" (Washington, DC: Natural Resources Defense Council, 2002), <http://www.nrdc.org/nuclear/nudb/datab3.asp>.

14. "LGM-30G Minuteman III," fact sheet, US Air Force, December 2009, <http://www.af.mil/information/factsheets/factsheet.asp?id=113>.

15. Natural Resources Defense Council, "Table of US Ballistic Missile Submarine Forces" (Washington, DC: Natural Resources Defense Council, 2002), <http://www.nrdc.org/nuclear/nudb/datab5.asp>.

16. See Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966). In this seminal work on coercion, Schelling lays out the concepts that served as the rationale for Cold War deterrence strategy.

17. David S. Painter, *The Cold War: An International History* (New York: Routledge, 1999); and Stephen J. Cimbala, *The Past and Future of Nuclear Deterrence* (Westport, CT: Praeger Publishing, 1998), 11–12, 23–25.

18. Charles Krauthammer, "Don't Cash the Peace Dividend," *Time Magazine*, 26 March 1990, <http://www.time.com/time/magazine/article/0,9171,969672,00.html>; and Keith B. Payne, *The Great American Gamble: Deterrence Theory and Practice from the Cold War to the Twenty-first Century* (Fairfax, VA: National Institute Press, 2008), chap. 3.

19. See Joseph E. Stiglitz, *Globalization and Its Discontents* (New York: W. W. Norton, 2002), chap. 5.

20. Francis Fukuyama, "The End of History?" *National Interest*, no. 16 (Summer 1989): 4.

21. Obama, "Remarks by President Barack Obama."

22. Paul Lettow, *Ronald Reagan and His Quest to Abolish Nuclear Weapons* (New York: Random House, 2005), 6.

23. Hans M. Kristensen, Robert S. Norris, and Ivan Oelrich, *From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path toward Eliminating Nuclear Weapons*, Occasional Paper no. 7 (Washington, DC: Federation of American Scientists and the Natural Resources Defense Council, April 2009), http://www.fas.org/pubs/_docs/OccasionalPaper7.pdf; and Joint Working Group of the American Association for the Advancement of Science; American Physical Society; and Center for Strategic and International Studies, *Nuclear Weapons in 21st Century U.S. National Security* (Washington, DC: AAAS, APS, and Center for Strategic and International Studies, December 2008), <http://www.aps.org/policy/reports/popa-reports/upload/nuclear-weapons.PDF>.

24. Sidney D. Drell and James E. Goodby, *What Are Nuclear Weapons For? Recommendations for Restructuring U.S. Strategic Nuclear Forces* (Washington, DC: Arms Control Association, October 2007), http://www.armscontrol.org/system/files/20071104_Drell_Goodby_07_new.pdf.

25. This is an acknowledgement by the more pragmatic members of the abolitionist camp that unilateral disarmament is not possible. See George P. Shultz et al., "How to Protect Our Nuclear Deterrent," *Wall Street Journal*, 19 January 2010, <http://online.wsj.com/article/SB10001424052748704152804574628344282735008.html>.

26. Had the Pacific fleet been as large as advocated by the Department of the Navy in the years prior to 7 December 1941 and not constrained by an arms-limitation treaty, there is reason to believe that the Japanese would not have come to the conclusion that a "knockout blow" was possible.

27. Marcel van Leeuwen, "Russia Starts Ka-28 ASW Deliveries to China," *Aviation News*, 11 October 2009, <http://www.aviationnews.eu/2009/10/11/russia-starts-ka-28-asw-deliveries-to-china/>; and "Russian Sonar Technology," *Warfare*, <http://warfare.ru/?linkid=2085&catid=332> (accessed 29 January 2010).

28. Kristensen, Norris, and Oelrich, *From Counterforce to Minimal Deterrence*, 1–2.

Updating a Cold War Relic

Ensuring That the New Air Force Doctrine Document 3 Reflects Current Air Force Roles and Missions

Lt Col David K. Moeller, USAF*

The evolution of contingency operations, the rapid maturation of space and information warfare . . . have transformed the effectiveness of air and space power.

—Air Force Doctrine Document 1, *Air Force Basic Doctrine*, 17 November 2003

The United States Air Force is at a crossroads. In 2008 the secretary of defense dismissed the secretary and chief of staff of the Air Force and raised questions about the service's commitment to the US nuclear enterprise. Moreover, in light of the current counterinsurgencies in Afghanistan and Iraq, the other military services and defense analysts have openly questioned the need for a technologically advanced Air Force. Why have such actions and questions occurred? Why, specifically, does the Air Force seem to be losing credibility with senior defense officials?

One contributing factor could be that the Air Force has not revised and updated its doctrine to provide guidance on operational-level employment across the continuum of military operations; instead, those documents continue to favor kinetic operations during times of conflict. This bias tends to inhibit cross-domain integration of air, space, and cyberspace capabilities, thus placing Air Force planners at a disadvantage when they design joint operations.¹ Air Force doctrine serves as “a statement of officially sanctioned beliefs, warfighting principles, and terminology that describes and guides the proper use of air and space

forces in military operations.”² The key term here is *military operations*. During much of the Air Force's existence, it considered such actions major contingency operations against an adversary possessing significant conventional and/or nuclear military capability, an assumption that dictated the development of doctrine heavily favoring the wartime application of airpower.³ However, since the end of the Cold War, the concept of military operations has grown to include missions such as humanitarian assistance, disaster relief, counterinsurgency, irregular warfare, and theater-security cooperation with partner nations. The Air Force has published doctrine for these mission areas, yet the capstone publication for its operations—Air Force Doctrine Document (AFDD) 2, *Operations and Organization*, 3 April 2007—still reflects a narrow focus on kinetic operations that does not represent how the service contributes to the joint fight across the continuum of military operations.

During the process of updating and renumbering AFDD 2 to AFDD 3, doctrine writers should revise the content to provide Airmen a true capstone document that articulates foundational air, space, and cyber

*The author is currently assigned to the 333rd Fighter Squadron at Seymour Johnson AFB, North Carolina. A former instructor at the USAF Weapons School, Nellis AFB, Nevada, he is a graduate of the School of Advanced Air and Space Studies, Maxwell AFB, Alabama.

concepts and offers guidance for operational-level planning and synchronization during joint operations. Expanding this document to accurately reflect the capabilities that air, space, and cyber forces bring to the wide range of military operations will enhance our understanding of Air Force roles and missions, provide planning guidance to operational-level staffs, and create a single-source reference document that addresses the relationship among air, space, and cyberspace concepts, planning, and operations.

What Does Air Force Doctrine Document 2 Say?

AFDD 2, the capstone publication for operational-level doctrine, includes guidance for “organizing, planning, and employing air and space forces at the operational level of conflict across the full range of military operations.”⁴ Divided into eight chapters, it covers topics such as conducting operations, commanding Air Force forces (AFFOR), organizing air and space expeditionary task forces, nesting the air and space component within a joint force, and planning for joint operations; it concludes by discussing air and space operations centers and the AFFOR staff. This article confines itself to chapter 1, “An Introduction to Air and Space Operations”; chapter 2, “Operations”; and chapter 6, “Planning for Operations.”

Chapter 1 lays the foundation for understanding the nature of air and space power by noting that it “arises from the use of lethal and nonlethal means by air and space forces to achieve strategic, operational, and tactical objectives” and that “air and space power has the ability to conduct operations and impose effects across the entire theater, wherever targets or target sets might be found.”⁵ The chapter then describes how we should categorize targets by the effects we intend to produce as a result of engaging them rather than by their physical location. Such statements reveal that airpower intends to produce lethal and nonlethal effects throughout a theater of operations and

across the varying levels of warfare. Unfortunately, we find little support for these statements since the remainder of the chapter narrowly examines the kinetic application of airpower during major conflicts, drawing on examples from Operations Desert Storm and Iraqi Freedom. The chapter concludes with a brief discussion of the employment of air and space power utilizing parallel, asymmetric operations during offensive military actions.

Chapter 2 begins by declaring that “the overriding objective of any military force is to be prepared to conduct combat operations in support of national political objectives—to conduct the nation’s wars.”⁶ Even though many people may argue for a much more Clausewitzian objective—to support policy—and point out that conducting combat operations is a point along a broader continuum of state interaction, this opening statement accurately lays the groundwork for the follow-on treatment of an effects-based approach to operations (EBAO), the principal concern of the chapter. Framed within a construct of inducing change in an adversary to achieve a desired outcome, the well-balanced discussion of EBAO applies to operations during both peace and conflict, setting a baseline for expanding the topic in chapter 6.

The second section of chapter 2 addresses air and space (but not cyberspace) power across the range of military operations.⁷ It includes an overarching discussion of the need for air and space superiority before and during offensive operations, devoting just a small portion to air and space operations in other types of military actions. Of note, other than a listing under the heading “Crisis Response Operations,” the section “Engagement, Cooperation, and Deterrence Operations” enumerates only general examples of operations, without mentioning noncombatant-evacuation operations, peacekeeping, or humanitarian assistance. The chapter concludes by briefly addressing the political dimension of smaller-scale contingencies and the “Termination, Transition, and Redeployment” of forces. Thus,

the second section of chapter 2 provides only a general discussion and a listing of considerations. It omits the linkage between the EBAO methodology presented in the first part and the missions described in the latter portion. Most of the chapter contains only a roster of operations and no discussion specific to air and space operations except those that occur during major kinetic campaigns.

Chapter 6 contains an overview of the joint planning process, with an emphasis on

document enjoys support from 27 subordinate two-series doctrine publications that comprise a compendium of operational-level guidance available to the planning staff.⁸ However, only limited guidance exists on synchronization of air, space, and cyberspace activities, and the lack of information about a representative air campaign along a continuum of military operations detracts from the overall value of the document. Instead, AFDD 2 needs rewriting to supply

AFDD 2 needs rewriting to supply more accurate guidance to operational planners and to better portray the roles and functions of air, space, and cyberspace forces during a campaign.

joint operations. However, seven of its 24 pages review Joint Publication (JP) 5-0, *Joint Operation Planning*, 26 December 2006, and 10 expand the discussion of EBAO in chapter 2. In the remaining seven pages, which offer an overview of the joint air and space estimate process, AFDD 2 should provide guidance on synchronizing cross-domain air, space, and cyberspace capabilities into a holistic air campaign plan. As currently written, however, this chapter examines three topics (planning processes, effects-based planning, and the joint air and space estimate process) without clearly presenting an architecture for linking or relating the processes to produce a joint air and space operations plan for theater operations. Chapter 6 mentions AFDD 2-1, *Air Warfare*, 22 January 2000, and AFDD 2-1.9, *Targeting*, 8 June 2006, thereby reinforcing AFDD 2's concentration on kinetic operations during major conflicts.

In sum, AFDD 2 fails to meet its stated objective of offering guidance for "organizing, planning and employing air and space forces at the operational level of conflict across the full range of military operations," mentioned above. At present, this baseline

more accurate guidance to operational planners and to better portray the roles and functions of air, space, and cyberspace forces during a campaign.

What Should Air Force Doctrine Document 3 Say?

The Air Force promulgates and teaches doctrine as a common frame of reference on the best way to prepare and employ air and space forces.

—AFDD 1, *Air Force Basic Doctrine*,
17 November 2003

The current AFDD 2 "describes how the US Air Force organizes and employs air and space power at the operational level across the range of military operations."⁹ The document does not reach this lofty goal because of its focus on the kinetic application of airpower during major conflicts. Furthermore, it fails to develop the following foundational doctrine statements: "air and space power operates in ways that are fundamentally different from other forms of military power"; "air and space forces can wrest the

initiative . . . anticipate the enemy, and take advantage of tactical and operational opportunities”; and “when employed aggressively, air and space forces can conduct operations aimed directly at accomplishing the joint force commander’s . . . objectives.”¹⁰ The rewrite, AFDD 3, should truly describe the employment of air, space, and cyberspace power across the continuum of military operations by incorporating the “best practices” outlined in the 27 supporting two-series publications. Ironically, the Air Force already possesses a construct for a holistic capstone document with multiple supporting documents—the three-series publications.¹¹

Highlighting Air Force tactics, techniques, and procedures, this series serves as “tactics manuals” for employing the vast majority of air and space platforms and concepts. At the forefront of this series is a capstone document divided into three sections, the first of which describes the fundamentals of airpower and the role of tactical command and control. From this baseline, the document covers tactical mission planning and mission-planner considerations using concepts taken from the supporting three-series publications and designed to convey general information that tacticians need to understand fundamental planning factors for carrying out the tactical mission. The final section offers an overview of various topics such as space and information operations. The three-series publications succeed in providing tacticians a well-organized, concise construct that explains basic planning factors for tactical-level integration augmented by detailed discussion in supporting publications.

A proposed construct for AFDD 3 would follow the same guidelines and include three separate sections, the first of which would present an overview of airpower and its relationship to joint forces. It would retain topics such as commanding and organizing AFFOR, given their overall consistency across the continuum of military operations, but omit any mention of the AFFOR staff as well as the air and space

operations center since the supporting two-series publications could address staff functions. The first section would also address the joint authorities that the joint force commander could delegate to the AFFOR commander. Such authorities should include the joint force air component commander, area air defense commander, airspace control authority, and space coordinating authority—all foundational with regard to operational-level planning. Thus, this section of AFDD 3 would offer baseline guidance on how to organize and command AFFOR as well as integrate those forces into joint operations.

The second section would concentrate on guidance for planning full-spectrum air, space, and cyberspace operations. Because no Air Force doctrine manual dedicated to planning exists, the content of this section would resemble that of JP 5-0 and JP 3-30, *Command and Control for Joint Air Operations*, 12 January 2010. This section would discuss three related topics: the joint operation planning process-air (JOPP-A); the phasing of Air Force operations across the continuum of military operations from “phase zero” to the postconflict environment; and specific operational-planning factors for operations currently defined by AFDD 2 as “smaller scale contingencies,” “crisis response operations,” and “engagement, cooperation, and deterrence operations.”¹² As previously mentioned, given the absence of an Air Force doctrine manual dedicated to planning, the JOPP-A material would give the reader step-by-step guidance. The information on phasing, though closely related to the methodology of JP 5-0, would emphasize the planning of theater campaigns instead of major contingency operations. Thus it would present air and space power as a strategic asset able to generate theater effects ranging from deterring adversaries, through guaranteeing the security of partner nations and conducting kinetic operations against an adversary, to planning possible postconflict scenarios.

Additionally, the second section would build on the command relationships and authorities described in section one of the proposed AFDD 3 to deliver guidance on developing command relationships and synchronizing requirements for the various authorities into an operational campaign or task force.

The third section should focus on operations, offering a concise, general overview of the employment of air, space, and cyber forces in specific mission areas such as major combat operations, counterinsurgencies, disaster relief, space situational awareness, and cyber network defense. The format of this section would draw on important information from supporting publications—such as AFDD 2-1, *Air Warfare*, 22 January 2000, and AFDD 2-2, *Space Operations*, 27 November 2006—and therefore serve as a single-source reference for air, space, and cyberspace operations. Because this section would rely heavily on the supporting publications, extensive links should join it to the detailed information contained within those publications.

Conclusion

This recommended construct should move AFDD 2 beyond its current deficiencies, transforming it into a document—AFDD 3—that clearly links the foundational principles of air, space, and cyberspace; operational-level planning; and employment. This update is especially relevant since the concept of military operations continues to encompass more than major contingency operations and since requirements for joint operational planning continue to increase proportionally. We can leverage the Air Force's rich history of operations to design AFDD 3 as a document relevant to today's operational planners. As noted by AFDD 1, "doctrine shapes the manner in which the Air Force organizes, trains, equips, and sustains its forces."¹³ Consequently, this capstone guidance document for planning and employing air, space, and cyberspace forces at the operational level must include a holistic discussion that is relevant across the continuum of military operations. ✪

Seymour Johnson AFB, North Carolina

Notes

1. The author experienced this problem as a long-range planner for US Air Forces Central from 2008 to 2010.
2. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 3, http://www.dtic.mil/doctrine/jel/service_pubs/afdd1.pdf.
3. For a comprehensive discussion of the development of Air Force doctrine, see Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force*, 2 vols. (Maxwell AFB, AL: Air University Press, 1989).
4. AFDD 2, *Operations and Organization*, 3 April 2007, vii, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2.pdf.
5. *Ibid.*, 1.
6. *Ibid.*, 13.
7. The publication date of AFDD 2 (3 April 2007) may explain the absence of any discussion of cyber-

space. However, this omission underscores the need to revise and update the document to reflect cross-domain integration and planning of air, space, and cyberspace.

8. The term *two-series* refers to the fact that each manual's designation begins with the number 2 (e.g., 2-1, 2-2, etc.).
9. AFDD 2, *Operations and Organization*, [i].
10. *Ibid.*, xi.
11. The term *three-series* refers to the fact that each manual's designation begins with the number 3 (e.g., 3-1, 3-2.28, 3-3.4, etc.).
12. AFDD 2, *Operations and Organization*, 22–24, and 29. The 705th Training Squadron compiled a "Commander's Handbook for Joint Operation Planning Process-Air" that could be incorporated into AFDD 2 planning discussions.
13. AFDD 1, *Air Force Basic Doctrine*, 3.

Beddown Options for Air National Guard C-27J Aircraft

Supporting Domestic Response

Col John Conway, USAF, Retired*

Disasters, by their very nature, occur locally—in communities very often far removed from Federal assets. The elements of the homeland security enterprise geared toward responding to disasters are thus widely distributed. . . . State, local, territorial, and tribal responders will usually be the first official presence on the scene, while the Federal Government will provide support when effective response exceeds their capabilities.

—Quaddrennial Homeland Security Review Report, February 2010

Debate regarding addition of the Joint Cargo Aircraft (JCA) to the military's inventory has spanned numerous years, and the program has endured many revisions. Envisioned as a short-haul asset designed to deliver supplies the "last tactical mile," the JCA morphed from a joint aircraft into an Air Force-only platform that will reside solely in the Air National Guard (ANG) as the C-27J.¹ Its assignment to ANG units makes it a dual-role aircraft, used to support civil authorities in domestic crises in addition to fulfilling its combat role.

The National Defense Authorization Act for Fiscal Year 2010 (Public Law 111-84, 28 October 2009) included funding for the Air Force to purchase the first eight of a proposed 38 C-27J aircraft for the ANG.² Despite debate about the "correct" total number of C-27Js to procure after this modest start, a larger issue remains: where will we base these aircraft, and how will the C-27J support its nascent homeland security mission?

Congress has weighed in on these issues with questions regarding beddowns and funding but has given only passing recognition of the C-27J's potential homeland secu-

urity role. In separate reports to be attached to their versions of the FY 10 National Defense Authorization Act, both the House Armed Services Committee (HASC) and the Senate Armed Services Committee (SASC) directed the National Guard and Air Force to report on a C-27J basing plan within 120 days of the act's passage. The HASC's report contained concerns about the 12 C-27J beddowns previously earmarked for the Army National Guard and urged the Air Force to consider those locations for future C-27J basing. Language in the SASC report left the door open for additional C-27J purchases, referring to the currently budgeted number of 38 aircraft as a "floor" rather than a "ceiling." The SASC report also notes that any study regarding intratheater airlift must also give "due consideration" to the contribution of these systems to the homeland security mission.³ Concerns remain about whether 38 C-27Js represent a sufficient number for performing missions proposed for the aircraft.⁴ In a letter of 11 June 2009 to the chairmen and ranking members of both the HASC and SASC, the Adjutants General Association supported "fully fund-

*The author is a military defense analyst with the Air Force Research Institute, Maxwell AFB, Alabama.

ing 78 aircraft for the JCA program,” stating that doing so would “provide a critical capability to state emergency management and homeland security missions.”⁵ Regardless of the correct number of C-27Js, the aircraft seem destined to play a role in the burgeoning partnership between the Department of Defense (DOD) and Department of Homeland Security (DHS).

The *Quadrennial Defense Review Report of 2010* calls for increased ties between the Federal Emergency Management Agency (FEMA) and National Guard, directing that “the Department also will draw on existing National Guard forces to build a Homeland Response Force (HRF) in each of the ten Federal Emergency Management Agency . . . regions. These ten HRFs will provide a regional response capability; focus on planning, training and exercising; and forge strong links between the federal level and state and local authorities.”⁶ Although it does not specifically address the C-27J, the report’s language clearly indicates that DOD planning for “homeland response” will emphasize the FEMA regions. Given the fact that most disasters will not rise to the level of a national response like that for Hurricane Katrina, ensuring adequate tactical airlift support for each FEMA region offers a prudent way ahead to plan for contingencies less severe than national disasters. Doing so will also give state and local officials the opportunity to plan and exercise with tactical airlift assets.

The ANG has announced plans to base a total of 24 C-27Js by placing four of them at each of six locations, but it has not decided where to place the remaining 14 aircraft. Given the announcement of the six bed-down locations and the progress of bed-down planning, changing locations at this late date would be unwise. However, utilizing a squadron consisting of only four C-27Js as primary assigned aircraft (PAA) is not an optimal situation for both overseas employment and domestic use. Lt Gen Harry Wyatt, director of the ANG, has stated that the low number of aircraft (38 instead of the projected 78) will require in-

creased ratios of aircrews to aircraft since he believes that at least 16 of the 38 C-27Js bought by the US Air Force will support wars abroad at any given time.⁷ Moreover, routinely deploying all four aircraft from individual units will leave gaps in domestic-response capabilities. On the other hand, deploying with only two aircraft per unit will demand a “rainbow” with another C-27J unit to create a four-ship deployment. Assuming that the six C-27J units will stand up at different times (depending on funding and aircraft availability), merging airframes from different ANG C-27J units will prove difficult in the foreseeable future. Nevertheless, none of the projected beddown locations will affect the C-27J’s overseas support mission. However, considering the dual role of the aircraft, C-27J basing decisions will affect how quickly and efficiently the aircraft can fulfill their domestic-response mission.

Furthermore, the current ANG C-130 and C-21 — “bridge aircraft” for the C-27J bed-downs—do not provide sufficient tactical airlift coverage in support of domestic missions across the country.⁸ This problem becomes obvious when one matches these locations against the 10 FEMA regions (fig. 1).

FEMA Region X—including Alaska, Washington, Oregon, and Idaho—has an ANG C-130 unit in Alaska but no assigned ANG tactical assets in the rest of the region. Region VI (Texas, New Mexico, Oklahoma, Arkansas, and Louisiana) receives support from only one ANG C-130 unit in Texas. In contrast, Region IV, the rest of the Southeastern states (minus Virginia), has four ANG C-130 units. Other FEMA regions, particularly in the eastern half of the country, enjoy similar support from substantial numbers of C-130s and C-21s.

Creation of six ANG C-27J units will not significantly improve support for domestic response, primarily due to their planned beddown locations (fig. 2). C-27Js will replace four C-21 units (located at Bradley International Airport, Connecticut; Hector International Airport, North Dakota; W. K. Kellogg ANG Base, Michigan; and Mansfield Lahm Airport, Ohio), making this a zero-

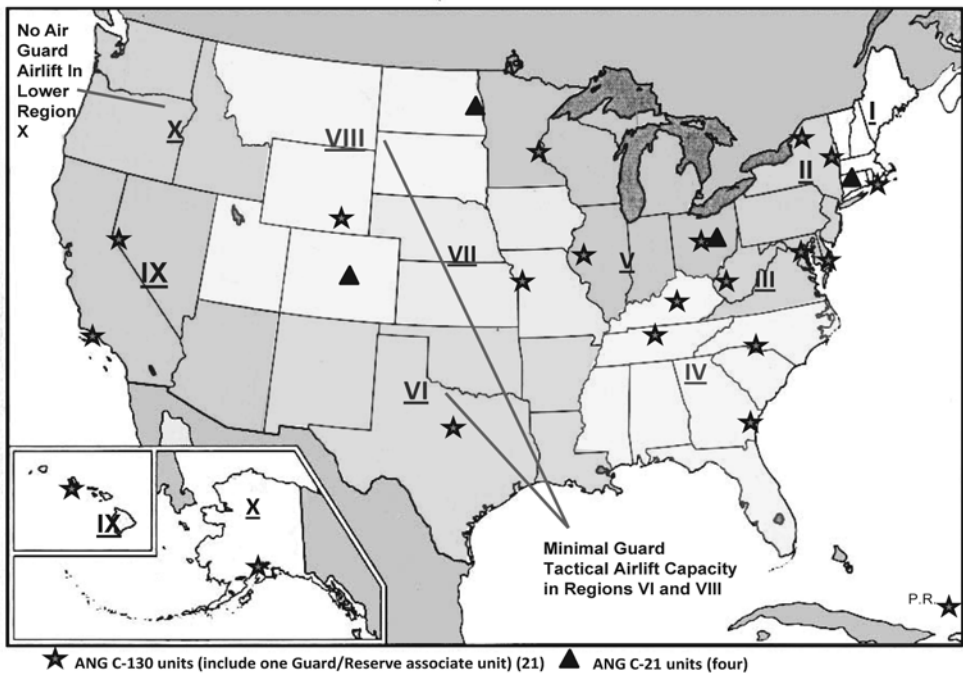


Figure 1. Current beddown of ANG tactical airlift aircraft by FEMA region

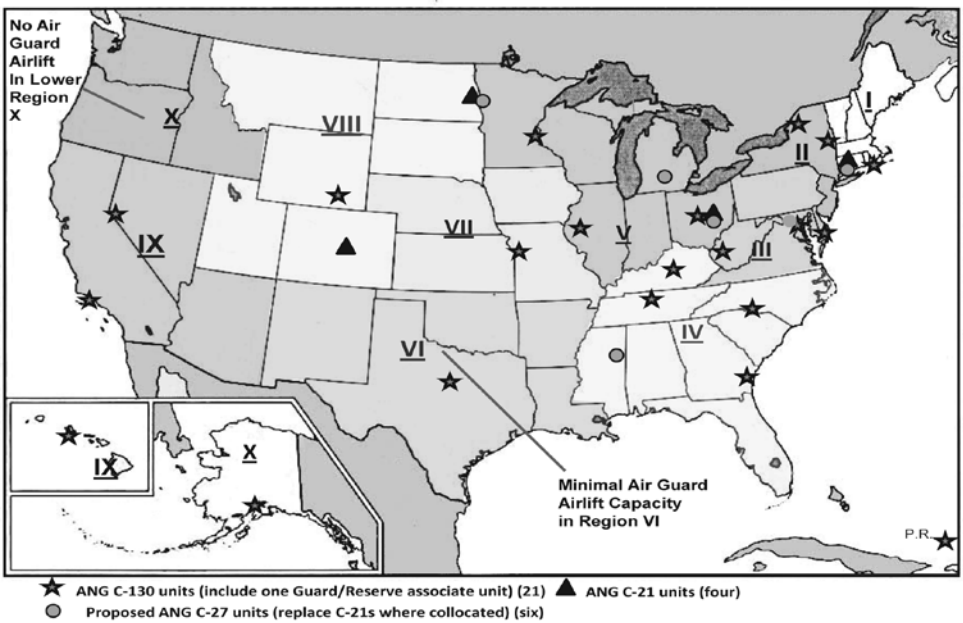


Figure 2. Planned beddowns of ANG C-27J aircraft by FEMA region

sum transfer of unit locations.⁹ A C-27J unit will stand up in Meridian, Mississippi (replacing a KC-135 unit), in Region IV, which already has an abundance of ANG tactical airlift assets. The other announced C-27J beddown at Martin State Airport, Maryland, is in Region III, which already has two ANG C-130 units to support it. Against this backdrop, thoughtful placement of the 14 currently unassigned C-27J aircraft can make a significant difference in airlift support for domestic emergencies.

Suggested options for basing the remaining 14 C-27Js in the initial buy depend upon the sole criterion of ANG tactical airlift support to FEMA. Again, basing of the aircraft in the continental United States has little bearing on their overseas deployments.

Since the Army National Guard had already planned for C-27J beddowns, the ANG would be prudent to review those locations as well. However, the 12 previously proposed beddown locations for Army

C-27Js continue the trend of overcapacity in some FEMA regions, particularly those located east of the Mississippi River (fig. 3).¹⁰ However, with 14 C-27Js currently unassigned to beddown locations, using some of the Army Guard's proposed beddown locations makes sense for FEMA support. Two options come to mind.

The Air National Guard C-27J: The Way Ahead

One option would have the ANG bed down four C-27Js at each of the six previously identified ANG locations. The first eight aircraft would go to the 119th Wing at Hector International Airport in Fargo, North Dakota, and the 103rd Airlift Wing at Bradley International Airport in Windsor Locks, Connecticut. The unit at Fargo, which replaces the C-21 bridge unit there, would augment FEMA Region VIII, cur-

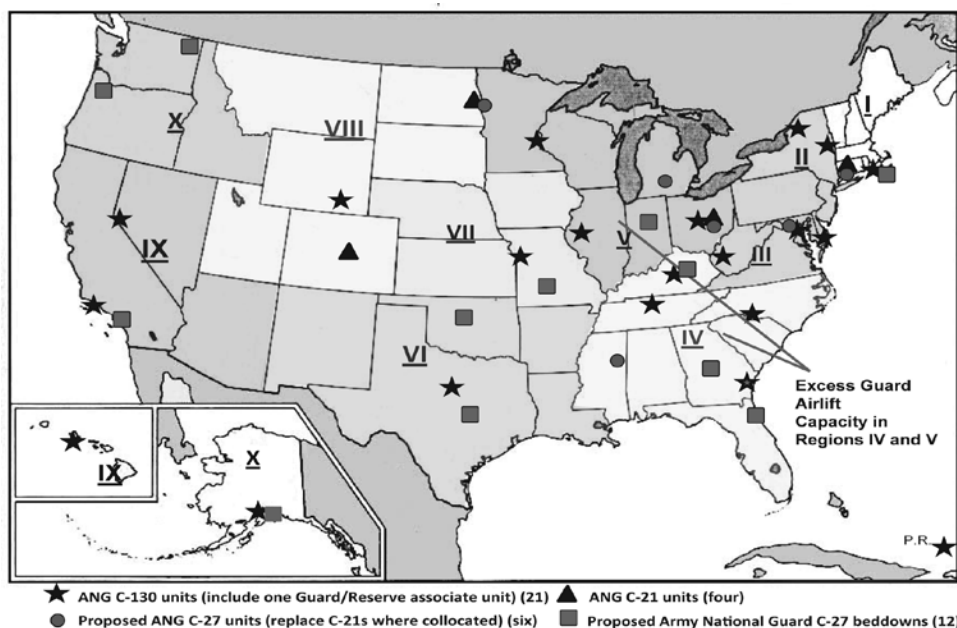


Figure 3. Proposed beddown of Army National Guard tactical aircraft by FEMA region (added to the existing laydown of ANG tactical airlift aircraft)

rently served only by the C-130 unit at Cheyenne, Wyoming, and a C-21 unit at Buckley AFB, Colorado. Located near the North Dakota–Minnesota border, the Fargo unit could also support Region V. The 103rd Airlift Wing, also a bridge-unit replacement, would augment the lone ANG C-130 unit stationed in FEMA Region I.¹¹

As planned, four C-27Js would go to each of the remaining four previously identified ANG beddown locations to complete the Guard's initial plan for the first 24 C-27Js. Based on the current number of 38 aircraft, the ANG should station two of them at its Advanced Airlift Tactics Training Center (AATTC) at Rosecrans Memorial Airport, Missouri, in order to develop specific tactics and training for C-27J crews (see table 1). Finally, each of the six ANG C-27J units would be augmented by two additional C-27Js from the remaining 12 planes as these aircraft become available. When all 38 aircraft are on station, each of the six units will have the ability to deploy a four-ship package overseas yet keep two aircraft at home station for domestic use.

Designed to create more units instead of adding aircraft to units slated to receive the C-27J, option two would have the ANG bed

down four C-27Js each at the six previously identified ANG locations, as in option one. Instead of placing 12 of the remaining 14 aircraft at these six units, the Guard would establish three new C-27J units (four PAAs each) at three of the Army National Guard's predesignated C-27J beddown locations. Two of the selected units—at Portland International Airport, Oregon, and Fairchild AFB, Washington—would support FEMA Region X, currently served by a lone ANG C-130 unit in Alaska. The third C-27J unit, located at March Air Reserve Base, California, would augment Region IX, currently served by only two ANG C-130 units. The final two aircraft (of the original 38) should remain stationed at the AATTC in Missouri, as proposed in option one, but should bed down before the last 12 in order to begin training in innovative tactics for the previous 24 aircraft and their aircrews (see table 2). Beddown of the final 12 aircraft at these three Army National Guard locations will make the best use of remaining resources, supporting the western FEMA regions as well as taking advantage of the existing infrastructure and trained personnel at the Army Guard's former aviation units.

Table 1. Option one: C-27J beddown projections (six PAAs) (first 38 aircraft)

<i>Aircraft Sequence</i>	<i>Original Base</i>	<i>New Base</i>	<i>Remarks</i>
1–4	Hector International Airport, North Dakota	Same	Supports FEMA Regions VIII and V
5–8	Bradley Airport, Connecticut	Same	Supports FEMA Region I
9–24*	Meridian, Mississippi	Same	Supports FEMA Region IV
9–24*	Mansfield Lahm Airport, Ohio	Same	Supports FEMA Region V
9–24*	Martin State Airport, Maryland	Same	Supports FEMA Region III
9–24*	W. K. Kellogg ANG Base, Michigan	Same	Supports FEMA Region V
25–26	Rosecrans ANG Base, Missouri	Same	C-27J AATTC
27–38	Two each at the first six bases above	Same	Units can deploy with four PAAs; two PAAs left for FEMA support

*Stand-up sequence to be determined

Table 2. Option two: C-27J beddown projections (four PAAs) (first 38 aircraft)

<i>Aircraft Sequence</i>	<i>Original Base</i>	<i>New Base</i>	<i>Remarks</i>
1–4	Hector International Airport, North Dakota	Same	Supports FEMA Regions VIII and V
5–8	Bradley Airport, Connecticut	Same	Supports FEMA Region I
9– 24*	Meridian, Mississippi	Same	Supports FEMA Region IV
9–24*	Mansfield Lahm Airport, Ohio	Same	Supports FEMA Region V
9–24*	Martin State Airport, Maryland	Same	Supports FEMA Region III
9–24*	W. K. Kellogg ANG Base, Michigan	Same	Supports FEMA Region V
25–26	Rosecrans ANG Base, Missouri	Same	C-27J AATTC
27–38*	March Air Reserve Base, California	Same	Original Army Guard beddown at March supports FEMA Region IX
27–38*	Fairchild AFB, Washington	Same	Original Army Guard beddown at Fairchild supports FEMA Region X
27–38*	Portland Army National Guard Base, Oregon	Same	Original Army Guard beddown at Portland supports FEMA Region X

*Stand-up sequence to be determined

Back to the Future: Some Other C-27J Options

If Congress authorizes additional C-27Js in future years, the aircraft beddown locations may not be the same as the rest of the original Army National Guard locations. Missions could change, other ANG aircraft could retire and need replacing in order to keep established units open, or other unforeseen circumstances might affect basing decisions. Nevertheless, these previously identified locations can guide future C-27J basing decisions.

A Look down the Road: Acquisition and Beddown of the Next 40 C-27Js (Nine New Units, Four PAAs)

If the remaining 40 aircraft desired by the ANG and the states' adjutants general are eventually funded (for a total of 78 C-27Js), Guard planners should take a pragmatic look at future beddown locations for them. Although bedding down at all of the previ-

ously identified Army Guard locations will create overcapacity in some FEMA regions at the expense of others, doing so would make the best use of existing resources and infrastructure at each location and allow the Army Guard's skilled aviation personnel to transition into the ANG.

Using the model of four PAAs per squadron for basing these aircraft would create up to 10 more C-27J units—one more unit than the Army Guard's original 12-unit plan (options one and two already include three of the Army Guard locations). As the ANG adheres to the Army Guard's plan for nine additional locations and before it equips FEMA regions with an abundance of aircraft, the ANG should take care to maintain a beddown sequence that satisfies regions that have the least airlift capability. Instead of adding a 10th C-27J unit at a new location, the Guard should apportion the remaining four aircraft to the AATTC, increasing it to a six-PAA C-27J squadron and, in effect, creating a "10th" squadron. Moreover, adding more C-27Js to the AATTC should

occur earlier in the sequence than in previous options. The fact that extra crews will require additional training capacity drives the need for more airframes at the AATTC (see table 3). Sequencing of these aircraft takes into account only the needs of the various FEMA regions and does not reflect any order of merit for any unit.

The “Coast Guard” Buy

Although the FY 10 National Defense Authorization Act has approved the initial C-27J purchase, many individuals have called for more than the projected number of aircraft (38); furthermore, additional aircraft buys beyond these 38 may materialize. One intriguing funding option involves the DHS budgeting for and obtaining additional C-27Js. Assuming that the aircraft will have

a dual role—combat airlift and disaster response—and that only the ANG will operate them under authority of the governors of the several states, one can argue that the DHS will benefit from DOD-procured aircraft without incurring any of the attendant costs. Despite instances of DHS-purchased equipment for military units (e.g., chemical-warfare protective equipment and chemical-biological detection gear), a strict proviso forbids use of such equipment for any purpose other than supporting homeland security—the direct antithesis of the DOD’s purchases of dual-use equipment. For example, the ANG’s C-27J and the venerable C-130 can perform either DOD or DHS functions.¹²

A 2008 report from the Government Accountability Office (GAO) noted a planning and budgeting disconnect between the DOD and DHS: neither organization budgeted for

Table 3. Option three: C-27J beddown projections (follow-on buy of 40 aircraft) (four PAAs)

<i>Aircraft Sequence*</i>	<i>Original Base (Army Guard Plan)</i>	<i>New Base (ANG)</i>	<i>Remarks</i>
1–24	Austin-Bergstrom International Airport, Texas	Naval Air Station Joint Reserve Base, Fort Worth, Texas	Collocated with the 136th Airlift Wing (Texas ANG); supports Region VI
1–24	Bryant Army Airfield, Alaska/ Guam**	Kulis ANG Base, Alaska/Guam	Collocated with the 176th Wing, Alaska ANG
1–24	Quonset Point, Rhode Island	Quonset State Airport, Rhode Island	Collocated with the 143rd Airlift Wing; supports Region I
1–24	Will Rogers Army National Guard Base, Oklahoma	Will Rogers ANG Base, Oklahoma	Supports FEMA Region VI
1–24	Springfield Airport, Missouri	Springfield Airport, Missouri	Should remain to support new Missouri National Guard construction initiative
1–24	Cecil Field, Florida	Jacksonville ANG Base, Florida	Supports Southern FEMA Region IV
25–28	N/A	Rosecrans ANG Base, Missouri	Increases the AATTC squadron to six PAAs
29–40	Grissom Joint Reserve Base, Indiana	Fort Wayne ANG Base, Indiana	Collocated with other Indiana ANG units; supports Region V
29–40	Standiford Field, Kentucky	Standiford Field, Kentucky	Supports Region IV
29–40	Robins AFB, Georgia	Robins AFB, Georgia	Supports Region IV

*Stand-up sequence to be determined

**This Army Guard C-27 unit was slated to share its beddown location between Alaska and Guam.



USAF photo

A C-27J Spartan practices air-dropping bundles during flight testing of the plane at Yuma Proving Ground, Arizona, in early 2009. In April, through Resource Management Decision 802, Defense Secretary Robert Gates moved the C-27J program and its related direct-support mission from the Army to the Air Force.

unique military equipment to support homeland security, mistakenly believing that the other did so.¹³ This situation may have stemmed from failure to understand the roles of the nation's military in disaster response and reluctance to earmark a piece of equipment solely for that purpose in an era of declining resources. Given the relative youth of the DHS—a department born in the aftermath of the terrorist attacks of 11 September 2001 and still struggling to organize itself—this reluctance may be understandable. However, acquisition of the C-27J and its assignment solely to the ANG with the expressed desire that it have a role in disaster response may prompt exploration of a funding initiative for more C-27Js by the DHS.

The GAO report of 2008 also used the term “Coast Guard Option” to describe one choice for equipping the National Guard for

its domestic-support mission: “Under an alternative approach modeled after the Coast Guard, DHS would have authority and would provide funding to the National Guard Bureau to organize, train, and *equip* the National Guard with unique capabilities for civil support missions. The National Guard would maintain its existing command and control relationship for civil support operations” (emphasis added).¹⁴ Although the GAO report stopped short of endorsing this idea rather than the other two options, the concept is well worth exploring.

By using DHS funds to buy more C-27Js earmarked only for domestic response (following the “Coast Guard” model), we could acquire additional airframes without increasing the DOD's procurement budget. The proposed beddown locations outlined above would remain in effect, and these “DHS” aircraft would augment the inventory

of C-27J units as they became available. This method would free the DOD-procured C-27Js to deploy in support of current operations while maintaining a stable force of short-haul ANG aircraft at home. By law, DHS-procured equipment cannot be used for any purpose other than homeland defense; therefore, we could utilize these aircraft at any time and could augment them with other undeployed ANG C-27Js. The DHS would find it difficult to project a proper number of C-27Js to contemplate purchasing, but their current price (Congress allocated over \$319 million for eight C-27Js in the FY 10 National Defense Authorization Act) would make such a buy a serious investment for the department.¹⁵ However, failure to weigh in on the procurement of C-27Js could result in future deficiencies of short-haul airlift.

Conclusion and Recommendations

National disasters on the order of a Hurricane Katrina are far less common than local or regional catastrophes. However, the post-Katrina relief efforts by the nation's armed forces proved that, when such events occur, they will respond with everything necessary—aircraft and all—when and where needed. The availability of resources to transport personnel and equipment rapidly to the scene of disasters that fall short of a national catastrophe, however, remains less certain. The C-27J can help in this regard.

Current plans call for the purchase of C-27Js in insufficient numbers to have a significant impact on short-haul transportation, either overseas or domestically. The fact that 14 C-27Js within the initial buy of 38 are currently not earmarked for any ANG unit compounds this problem. Acquisition of only 14 airframes for active duty is not a viable alternative, nor does it appear that the active duty Air Force wishes to do so. We should place these currently unassigned aircraft at locations that would best support FEMA's regional needs. Their

beddown locations will not have a bearing on their in-theater combat roles, but an unwise choice of locations could affect domestic response. Furthermore, Congress should revisit the original contracted purchase of 78 aircraft. The addition of 40 C-27Js would create a force large enough to fill both “last mile” transportation needs in-theater and domestic-response operations without sacrificing one for the other.

Since initial planning for the C-27J relied heavily on aviation assets of the Army National Guard, we should capture that expertise—following a suggestion by the HASC report—as an “Army to Air Force” resource. Just as “Blue to Green” transfers—from the Air Force to the Army—have become common, so could the National Guard embrace “Green to Blue” transfers within its own ranks. This personnel initiative would go hand-in-hand with bedding down additional C-27Js at previously proposed Army Guard locations that already host flight operations. Merging Army aviation personnel with new aircraft at their home stations could produce an operational unit in minimum time, save resources, and bring a new perspective to the Air Force's short-haul airlift operations.

In terms of selecting among future funding options, the DHS should consider budgeting and procuring additional airframes earmarked exclusively for supporting domestic disasters. By doing so, the department will break new ground in military support to civil operations and set a precedent for other purchases of single-use military equipment. The DHS will find this transition difficult and costly—but necessary. The DOD and Air Force should partner with the DHS to make this concept not only a reality but also a road map for future cooperation.

Today, we often hear leaders at all levels encouraging an “all in” approach to operations. We should heed that call with regard to acquiring, utilizing, and basing the C-27J. ✪

Maxwell AFB, Alabama

Notes

1. For a complete, albeit somewhat biased, review of the JCA deliberations, see “Joint Cargo Aircraft: We Have a Winner (?)” *Defense Industry Daily*, 23 April 2009, <http://www.defenseindustrydaily.com/joint-cargo-aircraft-we-have-a-winner-03372/>.

2. In addition to the \$319.050 million for the first eight aircraft, another \$9.353 million was made available to the Air Force for JCA “Research, Development, Test and Evaluation” in FY 10. *National Defense Authorization Act for Fiscal Year 2010*, HR 2647, Public Law 111-84, 111th Cong., 1st sess., 28 October 2009, 553, 583, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h2647enr.txt.pdf.

3. House, *Joint Cargo Aircraft Force Structure Requirements and Basing Plan; HASC Committee Report to Accompany H.R. 2647 NDAA*, 25 June 2009, 111th Cong., 1st sess., <http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000005390/HASC%20Report%20on%20NDAA%20JCA%20Language.pdf>; and Senate, *SASC Report 111-35, to Accompany S. 1390, FY10 NDAA Joint Cargo Aircraft Language*, 25 June 2009, 111th Cong., 1st sess., 31-32, <http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000005391/SASC%20Report%20JCA%20Language%20NDAA.pdf>.

4. Department of the Army and the Department of the Air Force, memorandum of agreement, subject: Way Ahead for the Convergence of the Army Future Cargo Aircraft (FCA) and the Air Force Light Cargo Aircraft (LCA) Programs, 16 June 2006, [http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000001623/JCA-MOA-\(20JUN06\).pdf](http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000001623/JCA-MOA-(20JUN06).pdf). Par.5.j.(3)(a) and (b) call for 75 aircraft for the Army and up to 70 for the Air Force. Debate continues regarding the correct number of aircraft. Is the original 2007 purchase agreement to buy 78 C-27Js still valid? Should that number be 91, as suggested in a study by the Institute for Defense Analyses? What about the original decision to purchase 145 JCAs, as detailed in the above memorandum of agreement?

5. Adjutants General Association of the United States, to Hon. Carl Levin, Hon. Ike Skelton, Hon. John McCain, and Hon. John M. McHugh, letter, 11 June 2009, [http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000005311/JCA%20Memo%20\(final\)3.pdf](http://www.ngaus.org/NGAUS/files/ccLibraryFiles/Filename/000000005311/JCA%20Memo%20(final)3.pdf). Fifty-three adjutants general signed the letter.

6. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 2010), 19, http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

7. Amy Butler and David A. Fulghum, “Reduced JCA Buy Calls for Higher Crew Ratio,” *Aviation Week*, 30 July 2009, http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/C27J073009.xml&headline=Reduced%20JCA%20Buy%20Calls%20For%20Higher%20Crew%20Ratio.

8. Following the 2005 Base Realignment and Closure Commission’s (BRAC) decisions, it was apparent that some ANG units would have a multiyear hiatus between weapon systems as BRAC-directed realignments occurred ahead of the arrival of replacement aircraft. These units received bridge aircraft in order to keep skilled cadres until assignment of follow-on aircraft. See US Government Accountability Office, *Military Base Closures: Management Strategy Needed to Mitigate Challenges and Improve Communication to Help Ensure Timely Implementation of Air National Guard Recommendations*, GAO Report 07-641 (Washington, DC: GAO, May 2007), 19, <http://www.gao.gov/new.items/d07641.pdf>. See also “C-21,” fact sheet, US Air Force, <http://www.af.mil/information/factsheets/factsheet.asp?id=88>.

9. Mansfield Lahm’s current C-130J inventory is slated to convert to the C-21 in the fall of 2010.

10. For example, utilization of all the proposed Army Guard beddowns would give FEMA Region IV eight tactical airlift units, and Region V (Minnesota, Wisconsin, Illinois, Ohio, Indiana, and Michigan) would have six. In contrast, Region VIII (Colorado, Wyoming, Utah, Montana, North Dakota, and South Dakota) would gain no new assets.

11. For all of the ANG’s current beddown locations, see *Airman Magazine: The Book, 2010* 54, no. 3 (March–April 2010): 11, <http://www.airmanonline.af.mil/shared/media/document/AFD-100302-029.pdf>.

12. See US Government Accountability Office, *Enhanced National Guard Readiness for Civil Support Missions May Depend on DOD’s Implementation of the FY2008 National Defense Authorization Act*, GAO-08-311 (Washington, DC: GAO, April 2008), table 2, p. 18, <http://www.gao.gov/new.items/d08311.pdf>.

13. For a detailed explanation, see *ibid.*, 4. Equipment purchased for homeland security missions with DHS funds cannot be used for other purposes, including war fighting; therefore, these DHS-procured C-27s could not deploy.

14. US Government Accountability Office, *Enhanced National Guard Readiness*, 23.

15. “Joint Cargo Aircraft: We Have a Winner (?)”

Finishing Strong in Iraq

Why the Air Force Must Be the Last to Leave Operation Iraqi Freedom

Lt Col William Jay Martin, USAF*

*If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: "Hold on!"*

—“If,” Rudyard Kipling

Of the virtues Kipling speaks about in his poem “If,” the United States Air Force certainly has demonstrated a willingness to “hold on” in Iraq, “serv[ing its] turn” long after everyone else has gone. This rang true after the 1991 Gulf War. In fact the Air Force never really left Iraq, carrying out Operations Northern and Southern Watch throughout the 1990s and into the next decade, and then prepping the battlefield for nearly two years prior to the invasion of 2003.¹ A sustained Air Force presence will prove just as necessary in the waning months of Operation Iraqi Freedom, particularly during the drawdown of ground forces. Therefore we must manage our expectations, not assuming that airpower needs will decrease proportionally with Army force strength or follow the same timeline. Air Force planners must guard against making “business decisions” when they determine our force requirement for the remainder of Iraqi Freedom, focusing instead on operational planning to drive those verdicts. Clearly airlift will have its predictable place in force redeployment, but other enablers like intelligence, surveillance, and reconnaissance (ISR), close air

support (CAS), and tactical air control parties (TACP) will be critical to America’s success. Due to a strong gravitational pull from Operation Enduring Freedom for resources and because of doubts about airpower’s efficacy in a mostly nonkinetic environment, the Air Force will have to show temperance by maintaining a robust war-fighting capability until the completion of ground-force redeployment.²

What factors will compel the Air Force to sustain a strong presence in Iraqi Freedom? First, airpower will have to uphold its current role in the counterinsurgency fight. The Air Force already pays a hefty mortgage in Iraqi Freedom—multiple fighter and reconnaissance squadrons as well as other miscellaneous aircraft, plus thousands of Airmen who perform myriad missions ranging from planning to policing.³ Second, the Army has assumed responsibility for Anbar Province from the Marine Corps, so without Marine aviation, Army helicopters and Air Force fighters and reconnaissance aircraft must perform the same missions over all of Iraq with fewer assets. These requirements have stretched resources, necessitating some creativity to ensure reliable com-

*The author commanded the 82nd Expeditionary Air Support Operations Squadron, Camp Liberty, Iraq, from April 2009 to January 2010. Currently he is an air liaison officer assigned to Fort Riley, Kansas.

mand, control, and communications over long distances. Finally, ISR, CAS, and TACP resources are essential to detecting the enemy and protecting convoys during the exodus of 120,000 American forces and their equipment, which will undoubtedly draw enemy attacks.⁴ Consequently, the Air Force must keep its withdrawal a half step behind the Army's, sustaining its current roles and commensurate force strength until the very last troops leave Iraqi soil.⁵

The support role of airpower is usually the most important and effective mission in guerilla war.

—James Corum and Wray Johnson,
Airpower in Small Wars

Iraqi Freedom: The War We Have, Not the War We Might Want or Wish to Have at a Later Time

The current counterinsurgency in Iraqi Freedom demands specific airpower capabilities and a substantial footprint of Battlefield Airmen to carry out related support and liaison functions. Air component missions in Iraqi Freedom are typified by ISR, CAS, and aerial electronic attack (AEA).⁶ As of November 2009, assets of the combined force air component commander (CFACC) flew at least a couple hundred hours of CAS, ISR, and AEA every week—substantially fewer than in the summer of 2009. However, the flying has not appreciably decreased because fixed-wing air capabilities become more—not less—important as ground combat power shrinks. In relative terms, Air Force support personnel should not re-deploy on the same timeline as Army brigade combat teams (BCT) when they leave the theater because there will still be an enemy to observe, jam, and kill if necessary. Furthermore, the months ahead hold too many tactical uncertainties. The seating of a new Iraqi government could cause a spike in violence that

might require every bit of air support the CFACC can provide. Couple that with a huge Iraqi battlespace, and Air Force resources in Iraqi Freedom suddenly begin to look scarce. For these reasons, a precipitous withdrawal of aircraft and Airmen is out of the question.

Top commanders agree that aircraft and Airmen are too important to overall mission success to permit their hasty withdrawal. Lt Gen Charles Jacoby Jr., USA, commander of Multi-National Corps-Iraq, told Lt Gen Gilmory Hostage III, USAF, the CFACC, that when it comes to airpower in Iraqi Freedom, intelligence, air presence, and response to troops in contact (TIC) are the most exigent airpower needs of ground commanders.⁷ The CFACC pledged his support and, despite the demand for additional resources in Afghanistan, resisted an early withdrawal of Battlefield Airmen as well as MC-12 and F-16 aircraft from Iraqi Freedom.⁸ Indeed, some individuals would err even further on the side of conservatism, suggesting that the Air Force presence should actually *increase* during the final phase of ground-force redeployment. Lt Gen Mike Short, USAF, retired, recommended posturing Air Force forces in Iraqi Freedom to handle the most dangerous enemy course of action—one that features a marked upswing in violence: “If we spread ourselves too thin and Soldiers die because they didn't get air support when they needed it . . . that would be a very bad headline for the Air Force.”⁹ Depending on tactical requirements in-theater, this concept of boosting Air Force presence may or may not occur, but for the time being, the Air Force will stay in full force, and for good reasons—not the least of which is intelligence gathering.

We think too small, like the frog at the bottom of the well. He thinks the sky is only as big as the top of the well. If he surfaced, he would have an entirely different view.

—Mao Tse-tung

In Counterinsurgency, Intelligence Is the Name of the Game

The skies over Iraq are laden with ISR aircraft, large and small, both manned and remotely piloted. With all-seeing eyes and other sensors, they detect, collect, and project all manner of activity into Army tactical operations centers. War fighters rely heavily on full-motion video feeds provided by aerostats, tower-mounted cameras, and aircraft to put eyes quickly onto hot spots when violence occurs. Many of these assets belong to the Army, but CFACC assets are still patrolling almost nonstop, providing nearly continuous coverage of specific interest areas and select lines of communica-

even as Iraqi security forces gradually assume full responsibility for maintaining peace. US forces often accompany Iraqi-led patrols, so as long as Americans are at risk, American aircraft should be available to perform missions to mitigate that risk. These missions include CAS even though the kinetic fight in Iraqi Freedom is almost nonexistent.

We Almost Never Drop a Bomb Anymore, so Why Keep Close Air Support Around?

CAS is the CFACC's primary means of providing the presence and TIC response that ground-force commanders deem indispensable.¹¹ True, there are plenty of ar-

The skies over Iraq are laden with
ISR aircraft, large and small,
both manned and remotely piloted.

tions in hopes of detecting a chameleon-like enemy. Although this persistent coverage rarely results in catching bad guys in the act, the data it provides becomes part of a body of evidence used to reconstruct events forensically after an attack occurs. Simply stated, it is detective work, and its value often goes unrealized until the evidence leads to the capture and arrest of the perpetrators. Even the Joint Surveillance Target Attack Radar System, sometimes viewed as too strategic an asset to make a tactical contribution, has provided moving-target indicator tracks connecting enemy rocket-launch sites to safe houses. Like footprints at a crime scene, they have led to the arrest of several terrorists.¹⁰ We have no reason to believe that this kind of support will cease,

guments against keeping CAS platforms in the fight. For instance, TIC situations in Iraqi Freedom are rarer now than ever, and even when a TIC occurs, CAS is not always the first or best means of handling it. Division commanders decide which asset, if any, they will send to assist ground forces under self-defense conditions. Air weapons teams, which include Apache and Kiowa helicopters, are often the most practical choice because just about every BCT's battlespace has them, and they can respond quickly. Often, redirecting fixed-wing CAS from its primary mission to a TIC is cumbersome, especially considering that the aircraft will probably never drop a bomb.

Also, despite the permissiveness of the rules of engagement for TICs, weapons drops have become extremely rare, particularly in urban areas. Ground commanders hesitate to “go kinetic” with airpower when the strategic consequences of collateral damage are unacceptable. Making matters worse, the longer we operate without pulling the trigger, the more difficult it becomes to go kinetic. In short, we’ve tied our own hands.

However, as BCT battlespaces increase in size and their troop numbers shrink, speed and range will become essential in responding to TICs. Fixed-wing CAS offers the only viable option to quickly reach remote US patrols, training teams, or convoys under attack. More than likely, however, such a scenario would take place months from now.

Meanwhile, the Army must cope with today’s full-spectrum missions even as its size and combat power dwindle. Ground commanders face an awkward period of dissonance between their mission and their force size in that they must fight today’s battle with tomorrow’s reduced strength. Combined Iraqi-US operations still take place in all quadrants of Iraq, but BCTs will soon find themselves physically unable to conduct full-spectrum operations across their entire battlespace. Consequently, they will have to either choose limited operations or transition to a new mission—something not scheduled to occur until after the seating of the new Iraqi government. In preparation for that choice, joint planning staffs must clearly define the roles and missions of advisory and assistance brigades in order to determine the necessary nature and scope of CFACC support. Undoubtedly, United States Forces–Iraq is working feverishly to define the end state of Iraqi Freedom and initiate Operation New Dawn, signifying the “evolving relationship with the Government of Iraq.”¹² That is the only way the CFACC—and, by extension, the Air Force—will

know when to stop flying and bring its Battlefield Airmen home.

It is . . . Airmen who transform hunks of metal, buckets of bolts, microprocessors, and circuitry into the Nation’s war-fighting edge.

—Gen T. Michael Moseley

The Tactical Air Control Party: The Army’s Essential Link to the Combined Force Air Component Commander’s Airpower

CFACC aircraft could not perform many of their support roles without an adequate number of TACPs embedded with Army units throughout Iraq.¹³ Because numerous Battlefield Airmen perform critical land-based functions in every facet of Iraqi Freedom, we will undoubtedly require a sustained presence of TACPs until the last US ground forces depart. This is a particularly large pill to swallow for the Air Force, considering the fact that the TACP career field is already stretched to the limit and that Afghanistan still has a large appetite for them. Granted, TACP numbers in Iraqi Freedom will slowly decrease as Army BCTs redeploy without replacements, but they must always be available as long as CAS remains an option. The Army has unequivocally stated that it needs fixed-wing CAS to maintain presence and TIC responsiveness.¹⁴ Given the possibility—no matter how slight—that a CAS aircraft will drop ordnance in close proximity to friendly forces, a TACP will control those aircraft as required by joint directives. We hope we have correctly judged the numbers of TACPs we will need, but recent experience casts doubt on that assumption.

The number of TACP personnel who must support Iraqi Freedom will largely be determined by the number of BCTs; that is to say, fewer BCTs equal fewer

joint terminal attack controllers (JTAC).¹⁵ The pooling of most TACPs at brigade level has worked fine so far, but some Army units at the tactical level are reaching a different conclusion. Specifically, as brigade battlespaces increase in size, TACPs may *not* have the necessary communications range to control CAS in support of a distant battalion.¹⁶ Army brigades once content with pooling TACPs at brigade level are realizing that some battalions will need a collocated TACP; otherwise, they may have no CAS capability at all. Both services assumed that fewer CAS sorties meant that TACPs could support an entire BCT by employing type-two control from a brigade's tactical operations center.¹⁷ In truth this assumption might not be practical because it would require a combination of technical solutions, TACP task organization, and utilization of the Army's joint fires observers (JFO).¹⁸ A relatively new breed of fire-support Soldiers, JFOs receive training in the Airman's perspective and language of CAS, thus creating more leverage on the battlefield for air support to ground forces.¹⁹ Undoubtedly, they will emerge as critical players in the command and control of CAS in the waning months of Iraqi Freedom, especially as the Army commences its large-scale redeployment—with convoys stretched out across remote highways headed for the Iraqi border.

“The Long Road Home”

During fiscal year 2010, compliance with security agreements between the US and Iraqi governments mandates that approximately 70,000 US Army, Navy, Air Force, and Marine Corps personnel depart Iraq and that an additional 50,000 redeploy by the end of December 2011, for a total drawdown of 120,000 personnel.²⁰ To put this in perspective, a mere 23,000 troops redeployed between January and October 2009.²¹ Relatively speaking, personnel are the easy part; equipment is the tough part.

As of December 2009, Iraq housed about 3.3 million pieces of US equipment, only a small portion of which will remain with the Iraqis as part of an authorized transfer outlined by Secretary of Defense Robert Gates.²² This daunting task will require a tremendous mobility effort by air, land, and sea, but the land movement will be the most dangerous.

What do we expect to happen as ground forces leave? We can count on opportunistic attacks with improvised explosive devices against US convoys, perpetrated by insurgent groups seeking to claim a final small victory. To mitigate these inevitable strikes, the CFACC will have to maintain a robust CAS, ISR, and AEA capability that can watch over and protect convoys and staging areas. According to Vice Adm James Winnefeld, USN, director of strategic plans and policy for the Joint Staff, “We intend to continue the drawdown in a manner that protects our military forces and civilians, exercises good stewardship of the resources provided to us, does not jeopardize the readiness of our military as we reset and leaves a stable, secure and self-reliant Iraq as a long-term strategic partner to the United States.”²³ Doing so will necessitate the continued participation of flying units, Battlefield Airmen, and many other Air Force enablers, resulting in a sustained Air Force presence until the very end.

Until every brow is soothed and every hand is held. Until every song is sung and every battle won. Until everyone comes home.

—Motto of the United Service Organizations

Conclusion

Many factors will compel the Air Force to maintain a strong presence in Iraqi Freedom at least until the end of December 2011, when all US forces are scheduled to be out of Iraq.²⁴ Until then, airpower

will have to uphold its current role in counterinsurgency, do so across a vast battlespace, and conduct protective overwatch of convoys during the redeployment of ground forces and their equipment. These tasks will demand cooperation and expectation management between the Air Force and the Army to ensure a safe, orderly withdrawal and conclusion to Iraqi Freedom.

Wisely, the CFACC has already taken steps to pace Air Force redeployment correctly, yet planning staffs—particularly from the Air Force—must stay the course and resist the urge to shift manpower and air assets from Iraq to Afghanistan too quickly. The Army will have to take an active role in air integration as well, especially with regard to JFOs. As they attempt to provide air support to ground units spread out over greater distances, both services will solve key challenges with a combination of technical solutions, organization

of TACP tasks, and utilization of Army JFOs. These solutions, critical to mission success, will reduce potential US casualties upon withdrawal.

During the last two decades, Airmen have learned that they are often the first in and last out of an operation, so it should come as no surprise that the Air Force must stay in Iraq for the duration. Airpower roles are inextricably linked to the ground commander's needs, and for the moment in Iraqi Freedom, air integration in the realms of CAS, ISR, and AEA is critical to America's success. Although the "shooting war" in Afghanistan demands more resources—some of them (such as TACPs) already in very short supply—we must show restraint. As Kipling said, we must have the will to hold on "long after [our turn]" and be the last to leave. ✪

Fort Riley, Kansas

Notes

1. Lt Gen Robert J. Elder Jr., USAF, retired, "Air-Mindedness: Confessions of an Airpower Advocate," *Air and Space Power Journal* 23, no. 3 (Fall 2009): 11–18, <http://www.airpower.au.af.mil/airchronicles/apj/apj09/fal09/fal09.pdf>.

2. Sgt 1st Class Michael J. Carden, "Iraq Drawdown on Track, Policy Chief Says," American Forces Press Service, 21 October 2009, <http://www.defenselink.mil/news/newsarticle.aspx?id=56339> (accessed 17 November 2009). The phrase "completion of ground-force redeployment" refers to all remaining US forces as defined by the president. Assuming that the United States maintains some military-advisory personnel in Iraq with a self-protection force, the ground-force commander will have to define the end state in terms of numbers of troops. Depending on what the new government of Iraq decides regarding its future security cooperation, a sustained US Air Force presence is conceivable.

3. JoAnne O'Bryant and Michael Waterhouse, *U.S. Forces in Iraq*, CRS Report for Congress RS22449 (Washington, DC: Congressional Research Service,

24 July 2008), <http://openocrs.com/document/RS22449/2008-07-24/download/1006/>; and Amy Belasco, *Troop Levels in the Afghan and Iraq Wars, FY2001–FY2012: Cost and Other Potential Issues*, CRS Report for Congress R40682 (Washington, DC: Congressional Research Service, 2 July 2009), <http://openocrs.com/document/R40682/2009-07-02/download/1013/>. The CRS reports 13,050 Airmen stationed in Iraq (10,800 active duty, 1,200 Air National Guard, and 1,050 Air Force Reserve) as of June 2008. These figures include only Airmen serving on Iraqi soil. They exclude the roughly 8,000 Airmen in Qatar and 2,000 in the United Arab Emirates (cited in R40682) since they may also support Operation Enduring Freedom. Although the numbers have decreased since 2008, they remain significant.

4. Carden, "Iraq Drawdown on Track."

5. Although US Airmen are helping to rebuild the Iraqi Air Force, the author doubts that it will have sufficient capacity to replace US airpower by 2011. Presumably, available Iraqi airpower will focus on supporting Iraqi forces. In addition, US reliance

on Iraqi airpower to support US forces may not be politically feasible.

6. AEA is used extensively for convoy protection. Although the Navy and Marine Corps are the primary providers of AEA, this enabler will remain the most valuable airpower contribution in Iraqi Freedom, especially during ground-force redeployment. The availability of sufficient Navy, Marine, and Air Force AEA to satisfy the Army's needs, given the size and number of convoys, remains uncertain. The timing and tactics of redeployment convoys will have to adapt to AEA coverage and vice versa.

7. Lt Gen Gilmory Hostage III, CFACC (remarks to members of the 368th Expeditionary Air Support Operations Group staff, 24 August 2009).

8. Ibid.

9. Lt Gen Michael Short, USAF, retired, former CFACC, interview by the author, 30 October 2009.

10. Author's personal experience, Headquarters MND-B, Baghdad, Iraq, 2009.

11. Hostage, remarks.

12. Defense Secretary Robert M. Gates to Gen David H. Petraeus, commander, US Central Command, memorandum, 17 February 2010, <http://a.abcnews.go.com/images/Politics/08144-09.pdf>.

13. A TACP is "a subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft." Joint Publication (JP) 3-09.3, *Close Air Support*, 8 July 2009, GL-18, http://www.dtic.mil/doctrine/new_pubs/jp3_09_3.pdf. It includes US Air Force members who communicate with most of the AEA and ISR assets that perform missions for ground commanders. The logical link between sky and ground in an Army tactical operations center, these members become particularly valuable when air assets are rerolled to perform alternate missions.

14. Hostage, remarks.

15. Under the current task organization in Iraqi Freedom, most TACPs are pooled at the brigade echelon and provide support to battalions on an as-needed basis. Consequently, the number of TACPs is smaller than the one outlined in a memorandum of agreement between the US Air Force and the US Army: "The USAF will provide a TACP to each US Army maneuver unit, corps through battalion, for liaison and terminal control of CAS missions." United States Army and the United States Air Force, subject: Army / Air Force Liaison Support, memorandum of agreement, 23 January 2008.

16. This depends on the quality of satellite communications and the remotely operated video-enhanced receiver, which allows TACPs to view signals from the aircraft's advanced targeting pod.

17. "Type 2 control is used when the JTAC requires control of individual attacks and *any or all* of the following conditions exist: JTAC is unable to visually acquire the attacking aircraft at weapons release, JTAC is unable to visually acquire the target, and/or the attacking aircraft is unable to acquire the mark/target prior to weapons release" (emphasis in original). JP 3-09.3, *Close Air Support*, xv.

18. Technical solutions suggested in this article pertain primarily to communications. Several options will improve reliable, long-range communications. First, satellite communications can provide position reporting and communicate with supporting aircraft, including those flying CAS. A second option involves installing ground-based repeater stations or, possibly, repeaters mounted on aerostats; unfortunately, the latter are vulnerable to sabotage by insurgents and to weather limitations (e.g., winds), which periodically require grounding the aerostats. A third option—airborne communication repeaters such as roll-on, beyond-line-of-sight enhancement and the battlefield airborne communications node—can surmount communications challenges posed by long distances and high terrain. A fourth option calls for putting a JTAC in an airborne platform or including a forward air controller—airborne in selected CAS formations. Ensuring complete communications reliability would probably require using two or more of these options.

19. "A JFO is a trained and certified Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 CAS, and perform [terminal guidance operations]. *The JFO adds joint warfighting capability but cannot provide terminal attack control during CAS operations.* JFOs provide the capability to exploit those opportunities that exist in the operational environment where a trained observer could be used to efficiently support air delivered fires, surface-to-surface fires, and facilitate targeting" (emphasis in original). JP 3-09.3, *Close Air Support*, II-10.

20. Carden, "Iraq Drawdown on Track."

21. Ibid.

22. Ibid.

23. Ibid.

24. Ibid.

Colombia Can Teach Afghanistan (and the United States) How to Win

Robert Haddick*

On 1 December 2009, Pres. Barack Obama revealed his new strategy for Afghanistan.¹ After adding 30,000 US Soldiers and Marines to the fight in 2010, the president intends to begin withdrawing US forces in July 2011 and turning responsibility for security over to Afghanistan's forces. Mr. Obama's plan calls for Afghanistan's army to be ready for this responsibility in 18 months. Yet, in spite of years of effort, Afghanistan's security forces will struggle to meet this goal. In the recent battle for Marja in Afghanistan's Helmand province, US and British infantry had to lead the assault against the Taliban, a worrisome indicator of the Afghan army's readiness.²

Recent US government reports reached troubling conclusions about Afghanistan's army. For example, 19 percent of the soldiers in the Afghan army quit or desert each year.³ The Afghan army lacks competent leadership at all levels as well as the ability to generate qualified leaders rapidly. Moreover, although the US government spent more than \$5.6 billion in fiscal year 2009 on training and supporting Afghanistan's security forces, the number of Afghan battalions qualified to operate independently actually declined.⁴ In spite of these problems with Afghanistan's existing army, Afghan and North Atlantic Treaty Organization (NATO) officials want to accelerate its expansion, from 97,000 troops currently to

171,600 by the end of 2011 and 240,000 within five years.⁵

Ten years ago, Colombia faced a security crisis in many ways worse than the one Afghanistan currently faces. But over the past decade, Colombia has sharply reduced its murder and kidnapping rates, crushed the array of insurgent groups fighting against the government, demobilized the paramilitary groups that arose during the power vacuum of the 1990s, and significantly restored the rule of law and presence of government throughout the country.

Over the past decade, with the assistance of a team of US advisers, Colombia rebuilt its army. In contrast to the current plan for Afghanistan, Colombia focused on quality, not quantity. Its army and other security forces have achieved impressive success against an insurgency in many ways similar to Afghanistan's. Meanwhile, despite the assistance of nearly 100,000 NATO soldiers and many billions of dollars spent on security assistance, the situation in Afghanistan seems to be deteriorating.

Afghan and US officials struggling to build an effective Afghan army can learn from Colombia's success. This article explores the similarities and differences between the insurgencies in Afghanistan and Colombia, examines how Colombia reformed its security forces, and discusses how to apply Colombia's success to Afghanistan.

*A former US Marine Corps officer, the author is managing editor of *Small Wars Journal*, writes the "This Week at War" column for *Foreign Policy*, and writes on foreign policy and defense issues for *The American*, the journal of the American Enterprise Institute.

Similarities and Differences between the Insurgencies in Colombia and Afghanistan

Counterinsurgency forces in Colombia and Afghanistan face several similar challenges. First, rugged terrain in both countries provides locations for insurgents to hide and limits the ground mobility of counterinsurgent forces. Second, insurgents in both Colombia and Afghanistan take advantage of cross-border sanctuaries and have financed their operations with narco-trafficking.

At their worst, the two insurgent forces had similar strengths. At their peak strengths (around 2001), the Revolutionary Armed Forces of Colombia (FARC) and National Liberation Army (ELN) insurgent groups could field a combined 21,500 fighters, about 1.9 fighters for every 1,000 military-aged males in Colombia.⁶ The upper estimate of the Taliban's current strength is 17,000, or 2.3 fighters for every 1,000 military-aged males in Afghanistan.⁷

In the mid-to-late 1990s, the rule of law in Colombia was minimal. In 1995 a quarter of Colombia's municipalities had no police.⁸ In the late 1990s, Colombia's annual murder rate was 62 per 100,000—nearly 10 times that of the United States.⁹ The police and court systems were thoroughly corrupt, and paramilitary militias formed in the absence of state authority.¹⁰ Ernesto Samper, president of Colombia from 1994 to 1998, reached office in the employ of Colombia's drug cartels.¹¹ In 2009, as a result of the insurgency, 2,412 Afghan civilians were killed—about 8.5 per 100,000 Afghans.¹² One could argue that in the late 1990s, Colombia's corruption, violence, and government ineffectiveness were worse than Afghanistan's today.

At the end of the 1990s, when Colombia's security situation was at its worst, the Colombian government lost nearly all ability to counter insurgent forces. FARC military units willingly engaged the Colombian army in open conventional combat. In Au-

gust 1996, a FARC force overran a Colombian army base in the Putumayo district, killing and capturing more than 100 soldiers. In March 1998, FARC fighters annihilated the 52nd Counter-Guerilla Battalion, considered at the time one of the army's elite units.¹³

Obviously, some stark differences exist between Colombia and Afghanistan. Colombia is a wealthier country, providing an indigenous base of income to pay for security forces. As fractured as Colombia was in the late 1990s, it had a history of effective central government. It also had experience with the Western notion of the rule of law. Afghanistan has little or no such history.

More tangibly, although the Colombian government was either ineffective or corrupt in the late 1990s, it at least had the structures of army and police forces in place. In 2002 the rebuilding of the Afghan army started from zero.¹⁴

Finally, the nature of international security assistance to the two countries is different. Colombia has one ally: the United States. America limits its military assistance to no more than 800 trainers, who are prohibited from accompanying Colombian security forces on combat operations. Although the United States' security assistance mission in Colombia is one of its largest, it pales in size compared to the mission in Afghanistan. There, more than 40 countries will provide close to 140,000 soldiers (in 2010), who will execute a variety of military missions.¹⁵ But the most important difference is the Colombian army's focus on quality, the factor that best explains Colombia's success.

How Colombia Fixed Its Army

Reform of Colombia's army began during Andrés Pastrana's term as president (1998–2002) and accelerated during Pres. Álvaro Uribe's tenure (2002–present).¹⁶ Three key reforms converted the Colombian army from an ineffective, garrison-bound band into an aggressive force that has crippled the FARC and ELN.

New Leadership

In 1998, at the urging of US officials, Pastrana replaced the top three leaders in the army with new generals (Fernando Tapias, Jorge Enrique Mora, and Carlos Ospina) who were trained at US military schools and who had extensive combat experience at the battalion and brigade levels.¹⁷ This new trio then replaced their subordinate commanders who lacked aggressiveness in the field. At this time, the Colombian army began to emphasize the selection and training of better-quality noncommissioned officers for the army's combat units.¹⁸ In his book *A Question of Command*, Mark Moyar studies a variety of counterinsurgency campaigns, asserting that leadership quality rather than campaign plans or tactics is the key to success.¹⁹ Colombia's performance against its insurgents bolsters Moyar's argument.

Reorganization

Beginning with the Pastrana administration and extending into Uribe's, Colombia reorganized its army into a mobile and highly skilled professional component; additionally, a draftee component formed for local security.²⁰ Under the tutelage of trainers from US Army special forces, the professional component of the army established numerous air-mobile, ranger, mountain-warfare, counterdrug, and special forces battalions.²¹ These units improved the army's overall effectiveness by specializing in specific tasks. Perhaps as important, Uribe focused the draftee portion of the army on village defense. He created more than 600 home-guard platoons, each composed of about 40 soldiers stationed in their hometowns, to provide basic security and collect intelligence on insurgent activity. These platoons interdicted the movement of insurgent units in the countryside and freed the professional army for offensive operations.²² The Colombian army also increased spending on logistics support and intelligence analysis, activities supported by the US advisory team.²³

Helicopters

Finally, Colombia's army and police expanded their inventory of helicopters from about 20 in 1998 to 255 by late 2008. To overcome Colombia's mountainous and forested terrain, the army needed air mobility. Today, with extensive US support, the Colombian army operates the world's third-largest fleet of UH-60 Blackhawk assault helicopters.²⁴ Colombia's helicopter fleet has made possible the army's offensive doctrine against insurgent support areas.

As a result of these and other reforms, the Colombian army inflicted severe damage on the FARC and ELN. One study estimated that, between 2002 and 2008, army attacks cut FARC offensive capabilities by 70 percent. By 2008 FARC military units, which overwhelmed Colombian army battalions in the 1990s, were unable to function in units larger than squad size. Between 2006 and 2008, more than 3,000 FARC fighters deserted the organization. FARC's remaining forces are believed to be scattered, disorganized, and cut off from their top-level leadership, which has fled into exile in Ecuador and Venezuela.²⁵

Colombia's Lessons for Afghanistan

Officials charged with building Afghanistan's army can learn three lessons from Colombia.

Quality Beats Quantity

Afghan and NATO officials seek to increase the size of the Afghan army from about 100,000 troops to nearly a quarter of a million.²⁶ In Colombia, by contrast, a professional army of just 86,000 has crushed a large and stubborn insurgency, essentially pacifying a country almost twice the size of Afghanistan and almost as rugged. Assisted by no more than 800 US trainers (who do not accompany the Colombian army into combat), Colombia has focused on selecting quality leaders, training the noncommis-

sioned officer corps, and developing specialized rather than general-purpose combat units within the professional portion of the army. In Afghanistan the goal is rapid expansion of the army's head count, regardless of whether the necessary leadership structure exists to sustain this increase. As a Soldier who spent his career in special operations, Gen Stanley McChrystal, the top commander in Afghanistan, is no doubt fully aware of the virtues of quality—a fact that makes this rapid growth in head count all the more puzzling. The lesson from Colombia is to freeze the expansion of Afghanistan's national army, emphasize soldier quality and leadership development, and create specialized units for required security tasks.

Home Guard

A current problem with Afghanistan's army (and formerly a problem in Colombia) is the unwillingness of many soldiers to serve far from their home villages and districts. Consequently, the Afghan national army suffers from high absenteeism and desertion.²⁷ As described above, President Uribe created home-guard platoons composed of draftees who serve in their villages and departments. Instead of expanding the size of the Afghan national army, the Afghan government should permit (and fund) district and provincial governors to form such home-guard units for local defense. Wardak Province is experimenting with the somewhat similar Afghan Public Protection Program.²⁸ Furthermore, in Nangarhar Province, the US military is providing assistance directly to a large tribe that has turned against the Taliban.²⁹ The US and Afghan governments should use the results of these experiments to improve and expand locally based units.

Helicopters

Like Colombia, Afghanistan faces the challenge of finding and massing against insurgent forces in difficult terrain. Colombia established a large helicopter force to bring mobility to its highly trained professional army and to evacuate casualties from the battlefield. Instead of raising the Afghan army's head count, US military assistance should emphasize this aspect of combat support.

Lessons for the US Campaign in Afghanistan

The United States could apply Colombia's experience to its campaign in Afghanistan. Most importantly, US military trainers should concentrate on constantly improving the quality, and not the size, of Afghanistan's 97,000-man national army. In addition, the Afghan army's own training and support establishment should bolster the district-level home-guard program rather than support continued expansion of the Afghan National Army. Lastly, the US security assistance program should expand Afghanistan's helicopter program.

Afghan and NATO campaign plans seek rapid expansion of the Afghan army even though Afghanistan lacks effective leaders to staff this increase, the logistics system to support it, or the helicopters to move it effectively through Afghanistan's vast and rugged terrain. A decade ago, facing similar circumstances, Colombia's leaders, assisted by a small team of US advisers, implemented a different solution that put Colombians in the lead, and, with patience, achieved great success. US and Afghan officials should learn from Colombia as they attempt to build an effective Afghan army. ✪

Bethesda, Maryland

Notes

1. Barack Obama, "Remarks by the President in Address to the Nation on the Way Forward in Afghanistan and Pakistan," Office of the Press Secretary, The White House, 1 December 2009, <http://www.whitehouse.gov/the-press-office/remarks-president-address-nation-way-forward-afghanistan-and-pakistan> (accessed 3 December 2009).

2. C. J. Chivers, "Marines Do Heavy Lifting As Afghan Army Lags in Battle," *New York Times*, 20 February 2010, <http://www.nytimes.com/2010/02/21/world/asia/21afghan.html?pagewanted=1&ref=world> (accessed 2 March 2010).

3. Thom Shanker and Robert H. Cushman Jr., "Reviews Raise Doubt on Training of Afghan Forces," *New York Times*, 5 November 2009, <http://www.nytimes.com/2009/11/06/world/asia/06training.html?pagewanted=1&r=3&ref=world> (accessed 30 January 2010).

4. Kenneth Katzman, *Afghanistan: Post-Taliban Governance, Security, and U.S. Policy*, CRS Report for Congress RL30588 (Washington, DC: Congressional Research Service, 30 December 2009), 76, <http://www.fas.org/sgp/crs/row/RL30588.pdf> (accessed 4 March 2010); and Shanker and Cushman, "Reviews Raise Doubt."

5. Kathy Gannon, "Afghans Plan Dramatic Increase in Security Forces," Associated Press, 20 January 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/01/20/AR2010012000393.html> (accessed 30 January 2010).

6. Peter DeShazo, Johanna Mendelson Forman, and Phillip McLean, *Countering Threats to Security and Stability in a Failing State: Lessons from Colombia* (Washington, DC: Center for Strategic and International Studies, September 2009), 5–6, http://csis.org/files/publication/090918_DeShazo_CounteringThreats_Web.pdf (accessed 18 October 2009); and Central Intelligence Agency, "Colombia," in *The World Factbook*, 4 February 2010, <https://www.cia.gov/library/publications/the-world-factbook/geos/co.html> (accessed 4 March 2010).

7. Katzman, *Afghanistan*, 44; and Central Intelligence Agency, "Afghanistan," in *The World Fact-*

book, 22 February 2010, <https://www.cia.gov/library/publications/the-world-factbook/geos/af.html> (accessed 4 March 2010).

8. DeShazo, Forman, and McLean, *Countering Threats to Security*, 9.

9. Ibid.

10. Ibid.

11. Ibid., 8.

12. Keith B. Richburg and Joshua Partlow, "United Nations: In Deadliest Year for Afghan Civilians, Taliban Did Most Damage," *Washington Post*, 14 January 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/01/13/AR2010011303378.html> (accessed 30 January 2010); and Central Intelligence Agency, "Afghanistan."

13. DeShazo, Forman, and McLean, *Countering Threats to Security*, 9.

14. Katzman, *Afghanistan*, 46.

15. Ibid., 43–44.

16. DeShazo, Forman, and McLean, *Countering Threats to Security*, 12–14.

17. Ibid., 14.

18. Ibid., 12.

19. Mark Moyar, *A Question of Command: Counterinsurgency from the Civil War to Iraq* (New Haven, CT: Yale University Press, 2009), 3.

20. DeShazo, Forman, and McLean, *Countering Threats to Security*, 12–14, 20–21.

21. Ibid.

22. Ibid., 20–21.

23. Ibid., 23.

24. Ibid., 24.

25. Ibid., 24–25.

26. Gannon, "Afghans Plan Dramatic Increase."

27. Katzman, *Afghanistan*, 41.

28. Ibid., 33.

29. Dexter Filkins, "Afghan Tribe, Vowing to Fight Taliban, to Get U.S. Aid in Return," *New York Times*, 27 January 2010, <http://www.nytimes.com/2010/01/28/world/asia/28tribe.html?pagewanted=1&ref=asia> (accessed 30 January 2010).

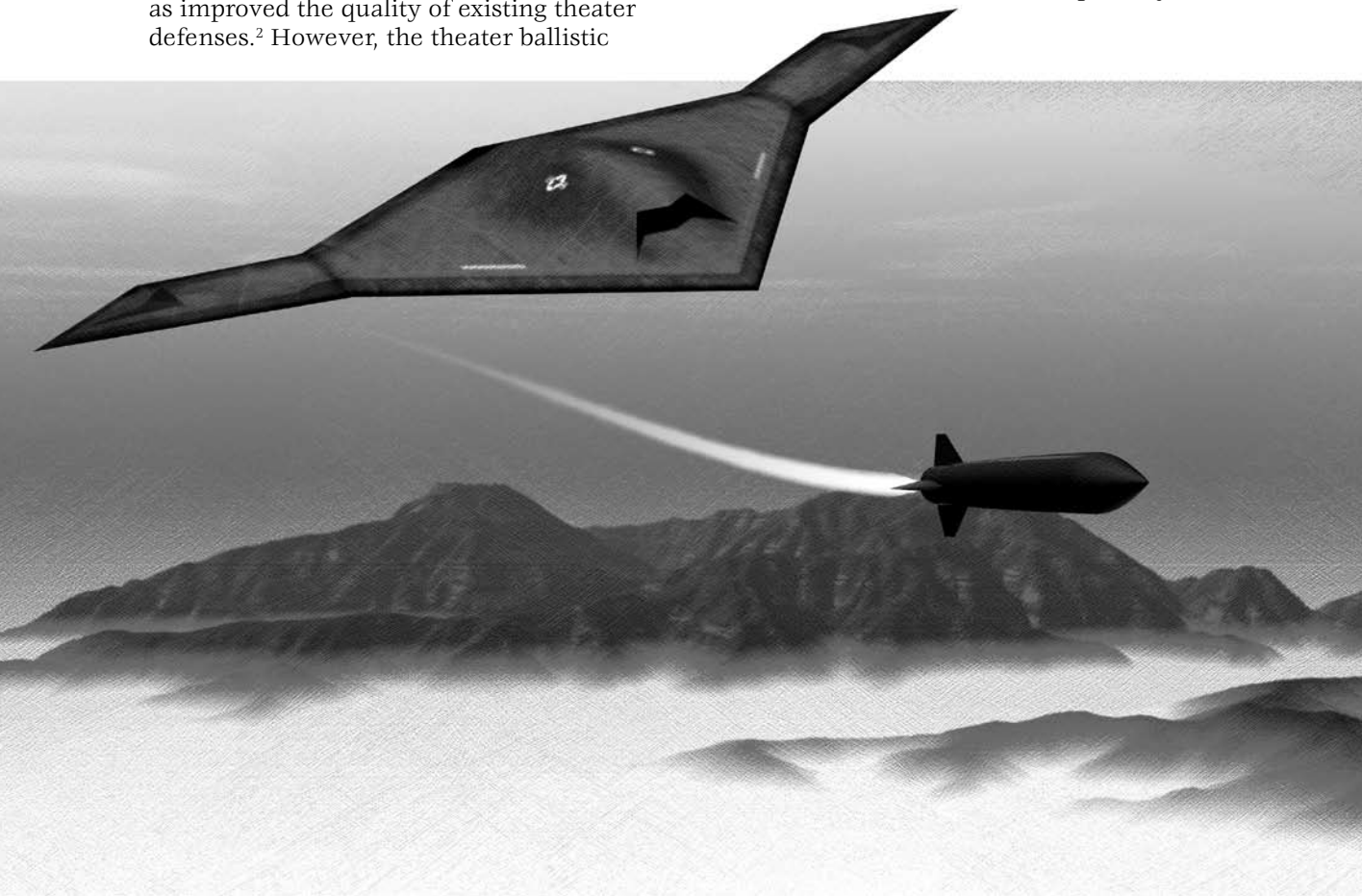
The Role of Airpower in Active Missile Defense

Col Mike Corbett, USAF, Retired
Paul Zarchan

Ballistic missile defense is a contentious issue. Some people consider it an essential tool for modern security; others believe that it diverts critical resources from more pressing needs.¹ Questions have continued to surface ever since the first German V-2 missile fell on Europe in 1944. During Pres. George W. Bush's administration, the military deployed an initial defensive capability against long-range missiles and increased the numbers as well as improved the quality of existing theater defenses.² However, the theater ballistic

missile (TBM) threat has also changed with the evidence of new, dangerous capabilities on the horizon.³ Given the new emphasis on capabilities against near-term regional threats, perhaps now is a good time to reexamine the role that airpower might play in this challenging mission area.⁴

What is the proper role of airpower, and what does it bring to active missile defense that surface- and space-based forces do not? Should combat air forces have a primary



role in this mission area? Finally, can we undertake a new mission area without jeopardizing the traditional core capabilities of the combat air forces?

Air-Launched Hit-to-Kill

This article describes a concept that treats ballistic missiles in the same manner as conventional air-breathing threats, using similar doctrine and many of the same technologies employed by today's combat air forces. Known as Air-Launched Hit-to-Kill (ALHK), this concept employs small kinetic interceptors directed to targets by a staring infrared search and track system (IRSTS). Initially fighters would carry the interceptors, but unmanned combat air systems would eventually assume that task as well. ALHK is not a new idea, but we and other individuals in the military, industry, and academia have worked to refine it into the concept presented here. This article argues that airpower enables this distributed operational concept and could enable the engagement of most threat ballistic missiles in the boost, ascent (early midcourse), and terminal phases of their flight.

Performance estimates offered here are based on unclassified threat models and timelines from the American Physical Society's report on boost-phase intercept systems, published in 2004.⁵ We used the society's models, incorporating them in a three-degree-of-freedom, three-dimensional, end-to-end simulation of the entire intercept process to generate the results contained herein. This Monte Carlo simulation (i.e., repeated simulation trials that produce statistical performance projections) includes sensor noise; realistic predicted intercept-point errors; and combat-proven guidance and filtering techniques that can be used to hit a target during its boost, ascent, or terminal phase of flight. This engagement simulation is an extension of the one originally presented in a previous work.⁶ Our results to date indicate that the ALHK system concept could engage ballistic missiles at their most

vulnerable points and, perhaps most importantly, do so in a cost-effective manner.

However, before we examine this concept, we need to take a closer look at the threat. Besides the number of missiles produced and the number of countries that have them, is the threat *really* growing? To date, conventional (nonnuclear) TBMs have never constituted a militarily significant capability that could hold key assets at risk or prevent the attainment of key objectives—although they could penetrate most defenses.⁷ A nuclear warhead changes the story, but we could argue that deterrence works pretty well against adversaries with enough capability to develop nuclear weapons. So, is the threat of TBMs really changing?

Indications suggest that it is. Countries such as Iran are building ballistic missile arsenals and equipping them with precision-guidance capability.⁸ This is not a tremendous technological jump, given access to the global positioning system or an equivalent system. It becomes just a matter of providing the warheads a means to navigate to their targets, in many ways resembling the way Joint Direct Attack Munitions work. The difference is that, instead of dropping them from an airplane, a TBM "tosses" in its warheads—but the last 15 seconds of flight would be very similar with both using aerodynamic forces to correct navigation errors. We must also consider other guidance methods (antiradiation, laser illumination, etc.) and decide whether any of these could also work with a ballistic-missile delivery system. We believe that at some point, even mobile assets may be at risk to precision attacks delivered by ballistic missiles.

Consequences of an Adversary's Obtaining Precision-Guided Theater Ballistic Missiles

To better understand the importance of precision guidance, we should consider how the German missile attacks on Antwerp could have changed the outcome of a

critical battle during World War II, had such guidance been available. From the fall of 1944 to the spring of 1945, the Allied campaign depended upon an adequate flow of material into Europe, and Antwerp was one of the few ports available. Thwarted by the Allies' air superiority, the Germans turned to V-1 and V-2 weapons to attack the port and slow the flow of Allied logistics.

Over 1,700 V-2s and 4,000 V-1s targeted the Antwerp area during this period although only about 30 percent reached the heart of the city.⁹ The attacks killed over 3,700 people, sank one ship, and constricted supply lines yet never put the port out of action. The impact might have proven decisive had the Germans been able to target individual ships, docks, or warehouses when the Battle of the Bulge hung in the balance.

The Thanh Hoa Bridge in Vietnam provides a historical example of the transition to weapons with precision guidance. For over six years, a total of 871 US Air Force sorties dropped unguided bombs on the bridge but failed to close it. However, the first operational application of laser-guided bombs on 13 May 1972 resulted in direct hits on the supporting piers, dropping the center span and closing the bridge.¹⁰ Although the US military has long understood the value of precision attack, to date we have never been threatened by such a strike. Precision-guided TBMs may change that in the near future.

Finally, we should consider an adversary's ability to concentrate his attack at a specific point and time. Timing multiple launches for simultaneous arrival is not difficult, and a sufficient number of ballistic missile launches can overwhelm any surface-based defense. Combining this ability to *mass* the attack (i.e., the simultaneous arrival of many weapons, a capability now possessed by some potential adversaries) with precision guidance would allow an adversary to overwhelm any surface-based defense system and destroy its critical tracking radars. The absence of sensors eliminates a defensive system's ability to intercept ballistic missiles, after which the

adversary can deny allied forces access to ports and airfields.

We believe that the threat is really changing in ways that will affect how and where future battles will be fought. This growth in an adversary's capability comes not from mating ballistic delivery systems with weapons of mass destruction but with precision guidance, which, combined with an adversary's ability to attack key locations in mass, may significantly inhibit a future allied force's power projection options.

A Closer Look at the Threat

TBMs are difficult to locate and need not emit any exploitable signals prior to launch. They can be hidden for long periods and then rolled out, erected, and launched without warning. Once the engine fires, the TBM becomes very visible and easily distinguishable from other missiles encountered on the battlefield. Surface-to-air missiles accelerate very quickly, their engines usually burn for less than 20 seconds, and they follow a somewhat erratic path as they guide toward their target.¹¹ Ballistic missiles, on the other hand, accelerate more slowly and their engines burn much longer. Those with longer range (medium to intercontinental) rise nearly vertically at first, taking as long as a minute to climb through an altitude of 10 kilometers (km). Depending on their size and range, their engines may burn for more than four minutes, and the missiles may have more than one stage. Some reach acceleration levels of 8 g's to 15 g's or more prior to burnout or staging.¹² (See fig. 1 for a simulation of a single-stage generic intermediate range ballistic missile's [IRBM] altitude and acceleration profiles.) It is important to note that part of the axial acceleration of the IRBM appears as a target maneuver to a pursuing interceptor, and the amount of required interceptor acceleration to engage the target is related to the magnitude of this apparent target maneuver.

An interceptor capable of defeating such a threat during the boost phase must be

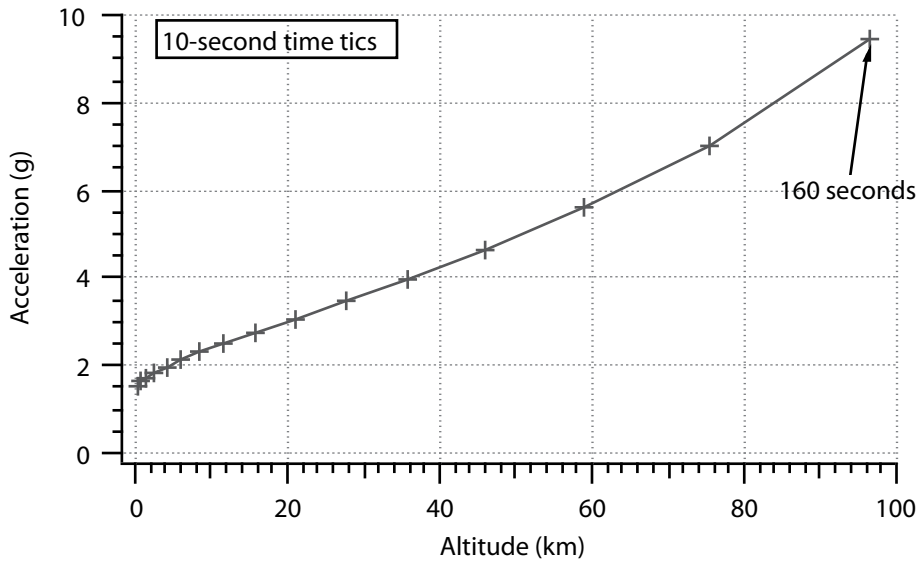


Figure 1. Generic IRBM acceleration as a function of altitude during the boost phase

able to accelerate similarly within the environment where the intercept will occur. Below 35 km, TBM acceleration levels are still relatively low, but they grow quickly as the threat consumes its fuel load. For intercepts above 50 km altitude, TBM accelerations can exceed 5 g's (fig. 1). The required increase in an interceptor's acceleration relative to the threat depends upon the geometry of the engagement and the type of guidance used. Traditional proportional navigation guidance demands that the interceptor have a significant maneuver advantage over the threat (a ratio of three to one or greater). However, we believe that optimized guidance can significantly reduce this maneuver margin, possibly to a fraction of the target's acceleration capability.¹³

After the boost phase, the guided warhead will likely separate from the booster, and defensive countermeasures such as decoys may also deploy. Unless a postboost system applies thrust—either to correct boost-phase navigation errors or compensate for a moving target—the flight path will remain ballistic and highly predictable during this midcourse period. Depending on the range

to the target, this ballistic period can last many minutes and give defending aircraft sites. In the case of our generic IRBM (fig. 2), we see that the midcourse phase of flight starts at approximately 200 seconds and ends at approximately 1,050 seconds, indicating that the target's flight path is highly predictable for about 14 minutes.

The terminal phase of a ballistic missile's flight begins when the descending warhead encounters the upper atmosphere at approximately 80 km altitude. Although the air is exceptionally thin at this point, it does exert a drag effect. Heating of heavy pieces begins, and light pieces such as chaff and decoy balloons fall back, each having identifiable signatures. As the descent continues, the atmosphere becomes progressively denser, and these effects increase. Heavy, irregular objects such as fuel tanks begin to tumble and eventually break up. By 30 km altitude, the air is dense enough for the control surfaces on a cone-shaped warhead to effect small maneuvers to compensate for guidance errors or begin target homing. Everything that remains intact during this

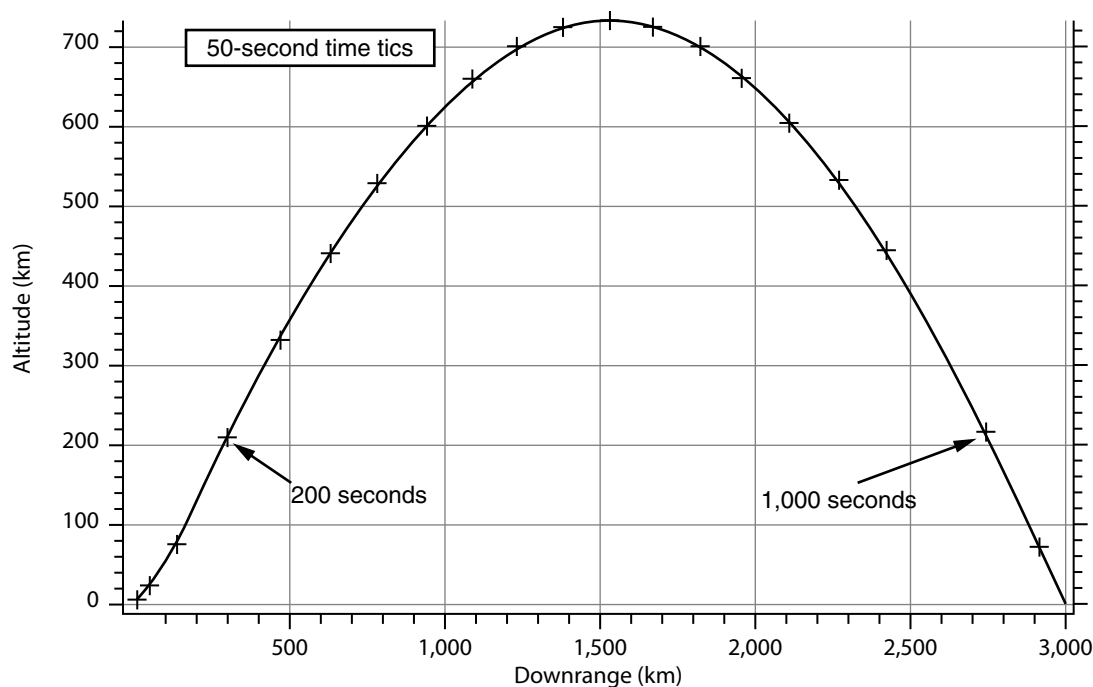


Figure 2. Duration and altitude of a generic IRBM's trajectory during the midcourse phase

period slows and starts to get very hot. By the time a warhead passes 15 km altitude, even the fastest warhead (one that has traveled the longest distance) has slowed to less than five kilometers per second (km/sec) and normally approaches its target from 20 degrees above the horizon or higher. This final descent to the target from 15 km altitude takes about 15 seconds, during which time aerodynamic forces enable the greatest maneuvering potential.¹⁴ A simple computer simulation, in which the ballistic coefficient for several items is treated as a constant, illustrates how these objects (balloons, tank, and reentry vehicle) traveling at 3 km/sec decelerate as they enter the atmosphere (fig. 3).¹⁵ Objects with the most drag (or smallest ballistic coefficient β) have their peak decelerations at the higher altitudes. The figure indicates that the deceleration profiles of all objects are different and that quantities related to the deceleration may serve as useful discriminators.

Although desirable, no single interceptor could engage all threats at any altitude from the surface up. Interceptors designed for engagements in the atmosphere below 35 km altitude can use aerodynamic forces for maneuvering but must cope with higher heating as velocities increase. We refer to these as lower-tier interceptors and show their performance based on a burnout velocity of 1.75 km/sec. Interceptors designed for higher altitudes must use lateral rocket thrust or thrust vectoring for maneuvering, and the complex interaction with missile-body aerodynamics creates adverse problems at altitudes below 50 km. These upper-tier interceptors also need much higher velocities but can avoid heating problems by performing intercepts only above 50 km. We indicate their performance based on a burnout velocity of 3.5 km/sec.

Both upper- and lower-tier interceptors have advantages and disadvantages during the terminal phase of flight. The upper-tier

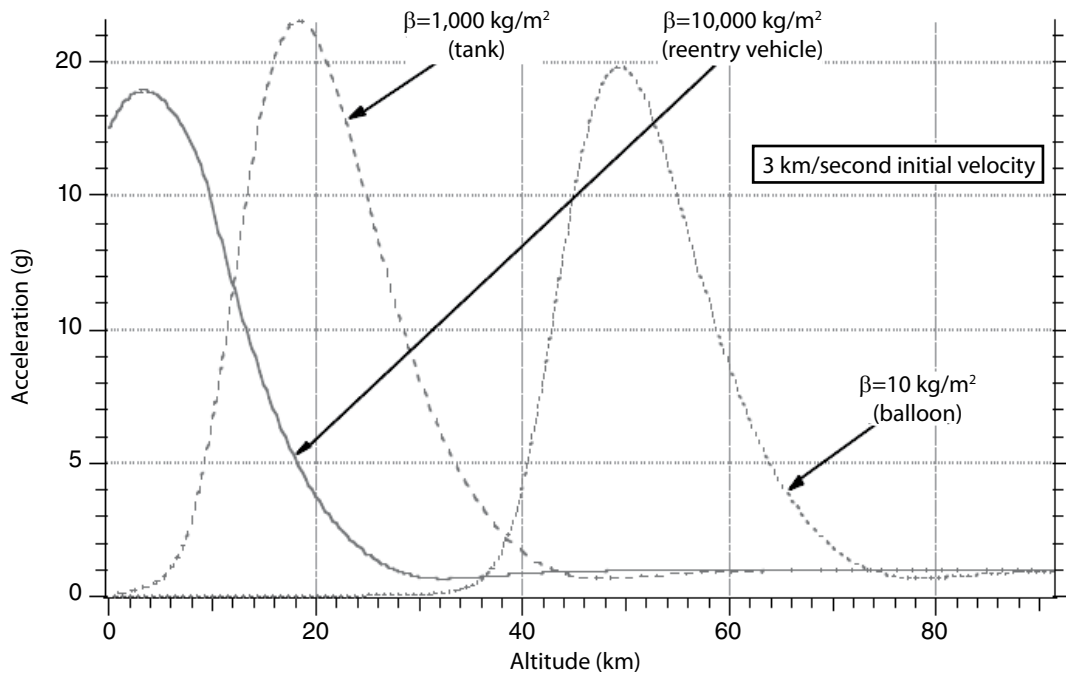


Figure 3. Early peak decelerations for objects with the most drag (or lowest ballistic coefficient)

systems would not have to cope with high deceleration levels, but having the agility needed for upper-tier boost-phase engagements would enable them to maneuver rapidly and intercept warheads as atmospheric interaction revealed the countermeasures. Lower-tier interceptors might have to deal with much higher deceleration levels and might have a very narrow engagement zone, if any, against the longest-range threats. However, a very low minimum-engagement altitude can permit a second shot if the first intercept attempt misses.

What Airpower Can Bring to This Fight

Airpower enables a distributed operational concept that can engage the TBM threat during the boost, ascent (early mid-course), and terminal phases of flight by

using common air-launched interceptors and a common aircraft-carried sensor. Airpower applied to missile defense provides more than simply a platform that can get close enough to the launch point to engage in the boost or ascent phase, or respond fast enough from ground alert to engage in the terminal phase.¹⁶ Airpower applied to missile defense allows a commander to focus defensive capability with the same speed and flexibility commonly associated with attack operations. Instead of utilizing a fixed defensive deployment tied to stationary radars, a commander could rapidly establish or reinforce a defensive posture, move aircraft forward to pursue boost or ascent engagements, or cover the movement of surface forces with a combat air patrol providing terminal defense.

In addition, launching an interceptor missile above 12 km altitude has a significant impact on its performance. Although

a supersonic fighter may be traveling only 0.3 km/sec, launching the interceptor missile at an altitude above 90 percent of the atmosphere has the effect of reducing aerodynamic drag on the missile and may add over 1 km/sec to the interceptor's burnout velocity.

For example, based on engagement-simulation results from previous works, a notional 3,000 km IRBM (figs. 4 and 5) launched from northern Iran toward Rome would impact in approximately 17 minutes.¹⁷ Strike or escort aircraft operating within Iran could autonomously detect and engage

threatening ballistic missiles during their boost phase. Moreover, combat air patrols operating in eastern Turkey could autonomously detect threats in their boost phase, engage them in their ascent phase, and subsequently pass precise threat-tracking data downstream for follow-on terminal engagements. Assuming nominal times for detecting the launch, issuing the warning, scrambling, and climbing out, fighter aircraft on ground alert at Aviano Air Base, Italy, would have sufficient time to scramble, acquire, and track the threat, and then launch an interceptor for a terminal-phase engage-

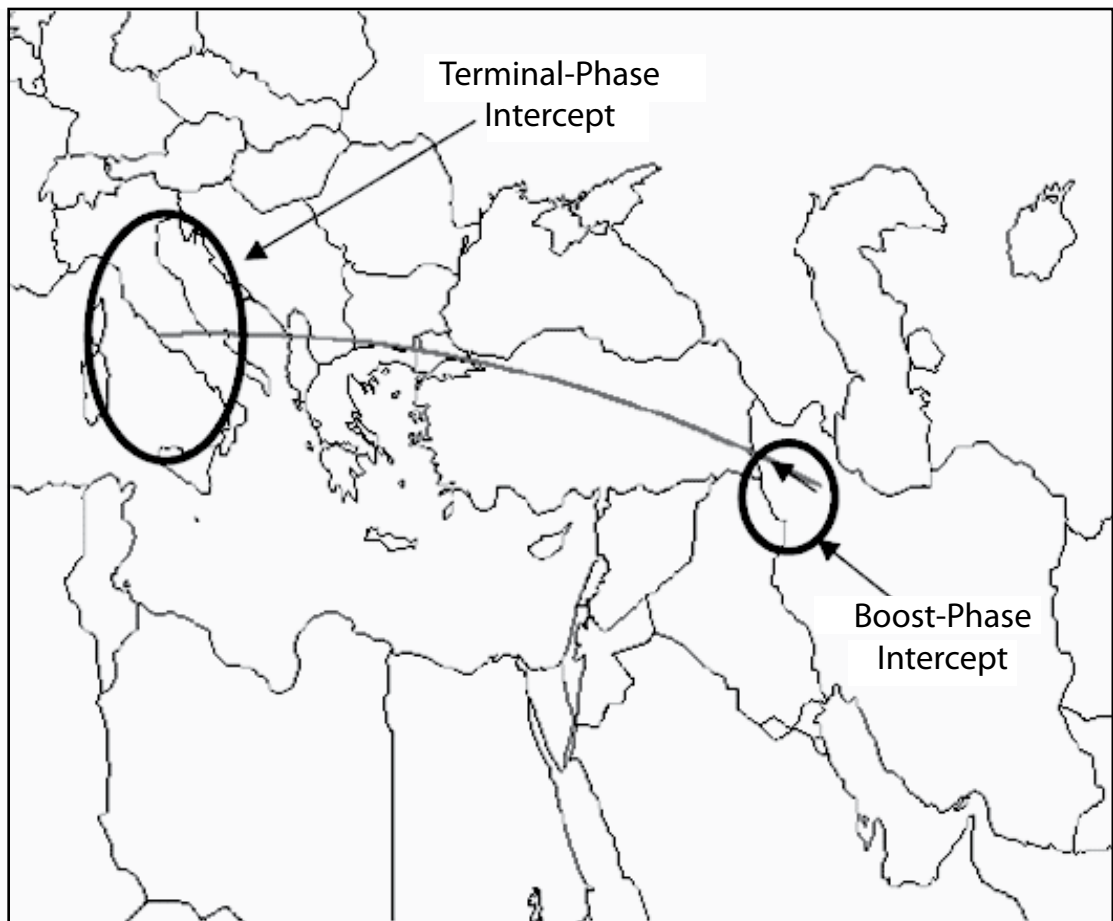


Figure 4. Operational areas for aircraft using a lower-tier interceptor to defend Rome against an IRBM launched from Iran

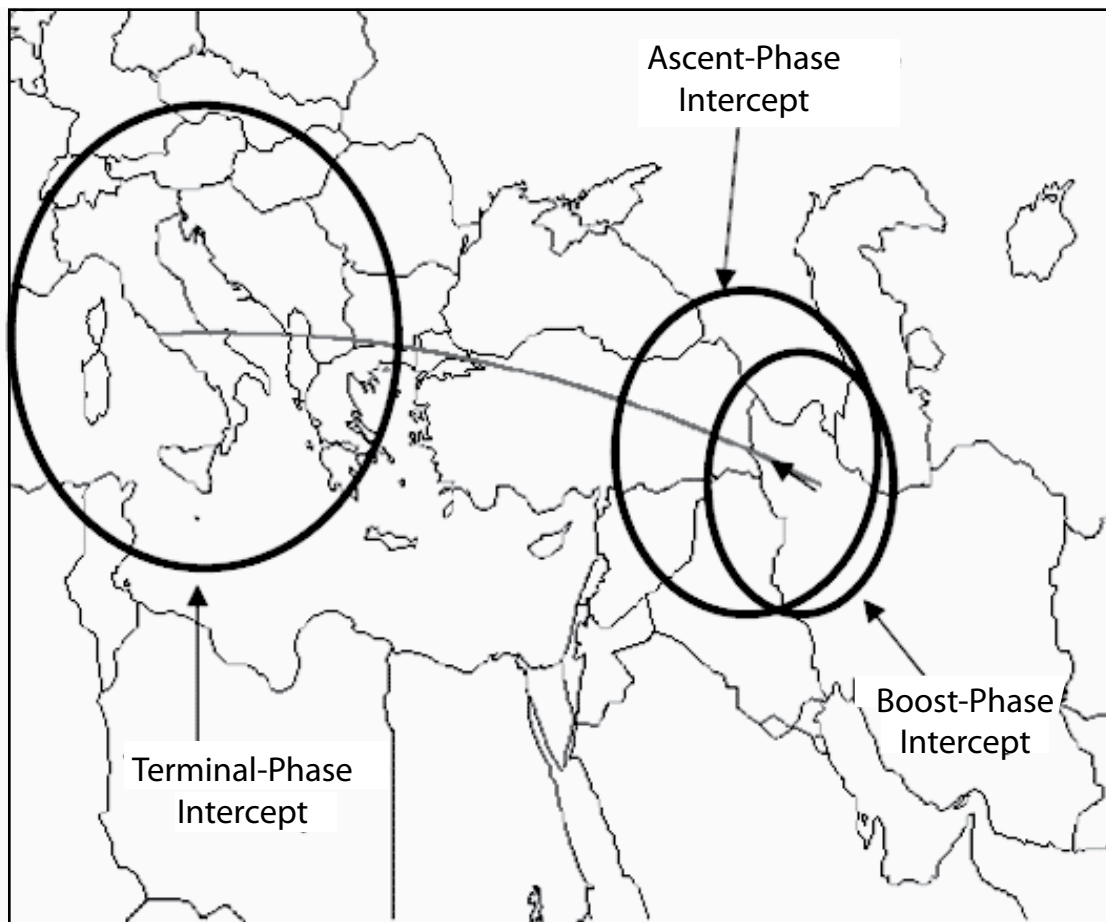


Figure 5. Operational areas for aircraft using an upper-tier interceptor to defend Rome against an IRBM launched from Iran

ment.¹⁸ The two figures represent operational areas for an aircraft defending Rome against an IRBM launched from Iran—figure 4 depicting the capability of a lower-tier interceptor and figure 5 representing the operational area of an upper-tier interceptor. We can see from figure 4 that the lower-tier system will not have ascent-phase capability against this category of threat.

Each aircraft can operate autonomously for boost- or ascent-phase engagements or as part of a network for terminal defense. Aircraft providing defense can be massed at a particular point or distributed over a large

area. They can provide terminal defense for a limited time at a port or airfield during deployment of a persistent surface-based system, or they can thin the wave of attacking threats through boost-phase engagements during fighter-sweep operations. Finally, but perhaps most importantly, we base this concept on the development of a small interceptor that should cost less than the threat it will attempt to engage, a characteristic that holds the promise of making air-power-based missile defense a cost-effective concept.

The Air-Launched Weapon

What would these defensive weapons look like? The size of the weapon is directly related to its maximum employment range. The air-launched interceptor must attain a high velocity so that it can quickly close the distance to the predicted intercept point, yet retain the capability to maneuver to the precise target location. It also requires sufficient lateral acceleration to actually hit the target. A lower-tier interceptor may use aerodynamic forces for maneuvering; however, any attempts by an interceptor to engage at ranges greater than 150 km will result in intercepts outside the atmosphere, thus requiring propulsive thrusters so that it could maneuver in response to guidance commands. Because maximum-range engagements in the boost phase require hitting the target near the end of that phase at the target's greatest rate of acceleration, the interceptor must have significant maneuverability. However, we must address two principal areas of technical risk: exoatmospheric maneuverability of the kill vehicle and ascent-/terminal-phase discrimination, discussed later in greater detail.

Lower-Tier Systems

The Net Centric Airborne Defense Element (NCADE) proposed by Raytheon Missile Systems is an interceptor roughly the size of today's advanced medium-range air-to-air missile (AMRAAM). Similar in shape to an AMRAAM, the two-stage NCADE lacks a warhead but has an infrared seeker.¹⁹ The seeker guided on and hit a boost-phase target in December 2007; subsequent testing revealed significant capability in terminal intercepts as well.²⁰ Due to its large fuel-to-mass ratio, two stages, and very light guidance system, NCADE is potentially several times faster than an AMRAAM.²¹ Such speed allows it to close rapidly with a boosting missile, giving it a maximum employment range of about 150 km. However, that range depends upon the threat's aspect, ac-

celeration, and distance into its flight when the interceptor launches.²² NCADE's proposed design also includes a lateral propulsive capability, which could enable some intercepts well above 35 km altitude.

The Air-Launched Hit-to-Kill concept proposed by Lockheed Martin Missiles and Fire Control uses a Patriot Advanced Capability 3 (PAC-3) missile as the interceptor.²³ Equipped with an active radar seeker similar to the AMRAAM's, the PAC-3 is a larger missile and even faster than NCADE. However, its greater length significantly complicates carrying it aboard aircraft and limits the number of missiles that any one aircraft could accommodate. However, this established missile, currently in production, needs little modification to employ from an aircraft and has an excellent performance record.

Both the NCADE and Air-Launched Hit-to-Kill use the kinetic energy of the intercept as the kill mechanism and do not carry an explosive warhead. Although designing an interceptor without a warhead may seem counterintuitive, the high closure velocities encountered in missile defense complicate proximity fuses and reduce the effectiveness of a blast warhead. Further, the kinetic energy of the interceptor mass at impact exceeds the chemical energy of an equivalent mass of TNT when the closure velocity exceeds 2.9 km/sec.²⁴

Upper-Tier Systems

Development of an upper-tier system involves two challenges: (1) building a kinetic-kill vehicle that can meet maneuverability and fuel requirements and (2) developing an aircraft sensor that has the discrimination capability for both ascent- and terminal-phase engagements. Long-range performance requires a larger, faster missile with a kill vehicle capable of enough exoatmospheric maneuvering to hit a target accelerating at 15 g's. Parametric analysis, based on the engagement simulation discussed in other works, indicates that we

should be able to build a 750 kilogram (kg) weapon that could reach a burnout velocity of at least 3.5 km/sec, retain sufficient fuel to accelerate an additional 1.5 km/sec to 2 km/sec (also known as divert velocity), and accelerate laterally at greater than 10 g's, enabling it to hit medium-range, intermediate-range, and intercontinental ballistic missiles.²⁵ Design constraints on such a weapon would allow it to fit internally into either the F-35 or the Navy's Unmanned Combat Air System—moreover, F-15, F-16, or F-18 aircraft could carry it externally.

Upper-tier systems are expected to engage only above 50 km in altitude, but this is not a hard limit. However, the ability to engage *well above* 50 km expands the boost-phase envelope and provides intercept capability during the ascent phase. The benefit of engaging at altitudes as low as 50 km is much more important for terminal intercepts, during which the atmosphere reduces the effectiveness of countermeasures.

Unfortunately, although we believe that such a system is feasible, no one has yet demonstrated the concept. Considering the complications of insensitive munitions requirements and the Navy's desire to avoid hypergolic liquid fuels, the design challenge becomes even greater.²⁶ The needed exoatmospheric agility, constrained by these operational requirements, represents the first of two main technical risks for this concept.

Figures 6 and 7 depict sample boost- and ascent-phase operational areas for a 3.5 km/sec interceptor employed against an IRBM from Iran threatening Rome. The small squares depict possible points from which aircraft could successfully engage IRBMs by using a 3.5 km/sec interceptor. Note that for a boost-phase intercept, the launch platform might have to operate in or very close to Iranian airspace. Alternatively, the aircraft's operational area for upper-tier ascent-phase intercepts offers the possibility of operating the launch platform well outside the borders of Iran.

The Aircraft Sensor

ALHK requires a precision tracking capability that will work at ranges out to 1,000 km. Fighter aircraft can climb above clouds rapidly, so a passive infrared sensor becomes a viable alternative to active radar. Infrared sensors will provide angle information only, but those angles are much more precise than the ones measured by radar; furthermore, active ranging data from either the fighter's radar or laser ranging (an optional function built into the infrared sensor) could probably be combined to make this a very precise tracking solution. If extreme range or the target's characteristics make active ranging unavailable, stereo tracking by two sensors separated by roughly 100 km will provide sufficiently accurate track data for boost- and ascent-phase engagements.

Analysis has shown that a staring infrared sensor with an aperture of about 15–20 centimeters could furnish the required performance.²⁷ That is, the sensor would closely resemble today's Sniper and LITENING targeting pods. In fact, we have demonstrated the Sniper pod's performance by tracking the ground missile defense (GMD) interceptor throughout the entire boost phase from two F-16s over Edwards AFB, California, during the GMD flight test (FTG-05) out of Vandenberg AFB, California, in December 2008.²⁸

This IRSTS sensor must do more than just detect and track; it must also assist the interceptor in discriminating between the warhead and other objects, such as decoys—a process that is complicated by natural debris as well as intentional countermeasures. We doubt that either the IRSTS or the interceptor seeker can do this individually; rather, a successful intercept will depend upon a contribution from each one. However, past observations of missile tests by similar systems give us reason to believe that it is possible. This discrimination capability for ascent- and terminal-phase intercepts represents the second of the two primary technical risks for this concept.

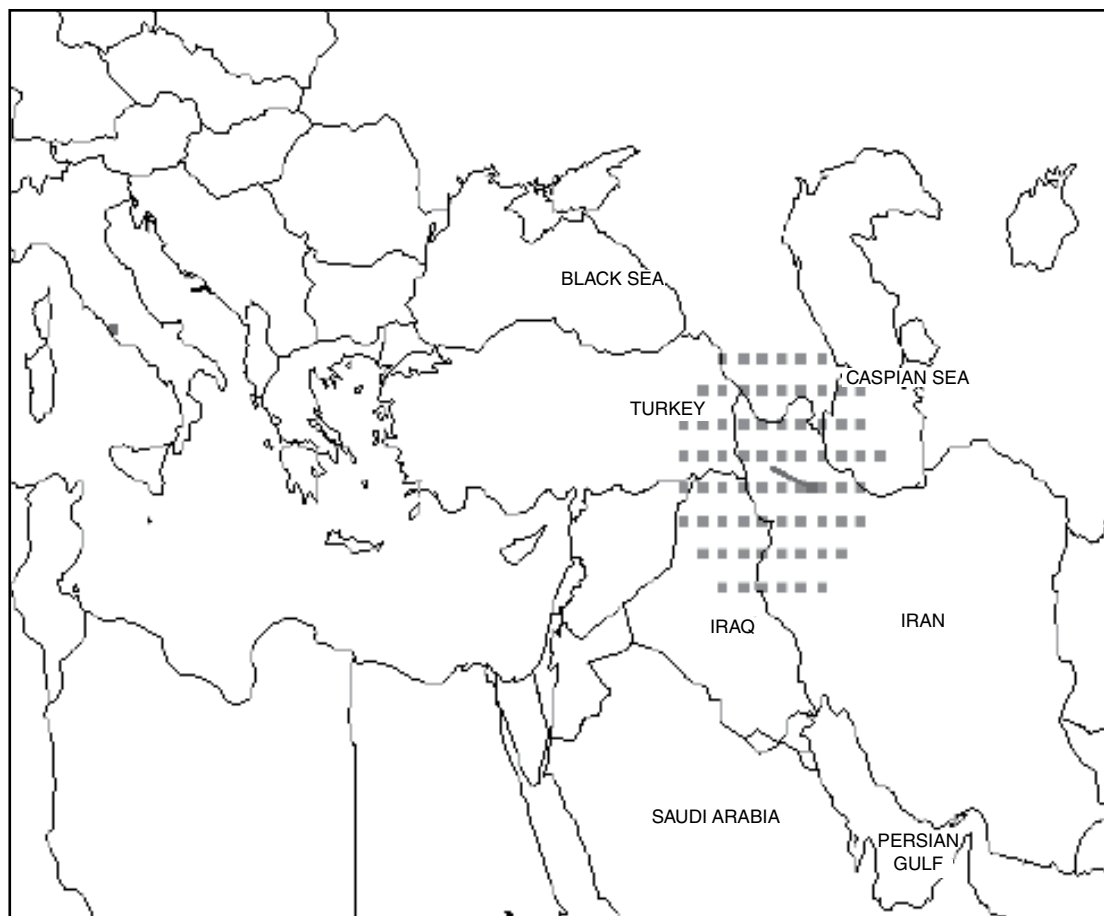


Figure 6. Boost-phase operational area, assuming launch of a 3.5 km/sec interceptor 10 seconds after launch of the IRBM target

Size Matters, but Smaller Is Better

The interesting thing about a missile's cost is its close relationship to the missile's weight. Although it may seem obvious that large ones cost more than small ones, plotting all recent unit production costs for missiles in relation to their weight more clearly defines this—and even suggests a formula. Eugene Fleeman observes that as a first-order design consideration, production cost is a function of weight. That is, $C_{1000} \sim \$6,100 W_L^{0.758}$ where C represents the unit

cost of the 1000th missile, and W_L is the weight in pounds.²⁹ Fleeman's database included only weapons up to 1,500 kg, so extending the formula to 25,000 kg is obviously questionable, but the historical relationship is that small missiles cost far less to produce than big ones. According to his formula, a 500 kg interceptor would cost 5.2 percent of a 25,000 kg interceptor (i.e., a ground-based midcourse defense interceptor); thus, higher production rates are possible, a fact that also drives down unit costs. Lower unit costs make more frequent test-

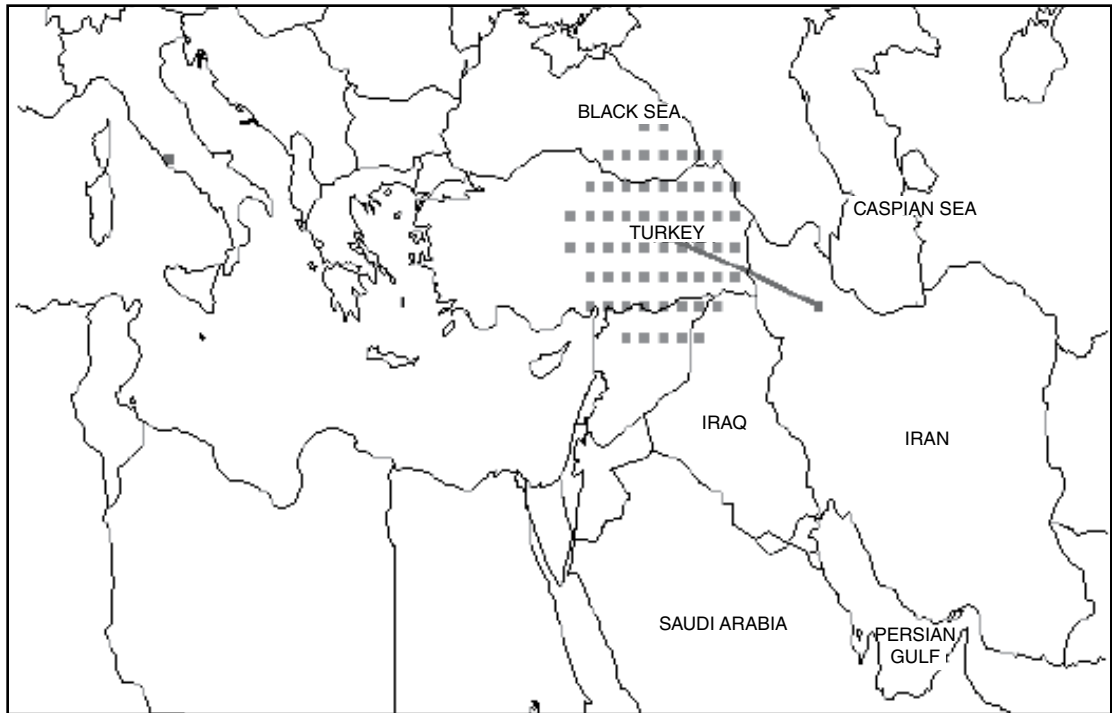


Figure 7. Ascent-phase operational area, assuming launch of a 3.5 km/sec interceptor 80 seconds after detection of the IRBM target and interception of target 270 seconds later (two minutes after IRBM burnout)

ing economically feasible, which in turn drives up confidence in system performance. But airpower provides the delivery platform, thereby enabling the small interceptor and making ALHK possible.

Summary

Many potential adversaries are pursuing precision accuracy in the delivery systems of ballistic missiles. Using combat aircraft to compete head to head with the United States is not a viable option for most opponents, but a ballistic missile provides them an alternative delivery system that could penetrate defenses. We contend that ALHK can defeat IRBM threats in a cost-effective manner. Although we have addressed only IRBM threats, other analysis has shown that

ALHK could engage most other ballistic missile threats as well.

A small interceptor launched from a stealthy fighter operating in or near contested airspace can provide the same kinematic performance as a much larger surface-based interceptor launched from well outside that area. In most cases, boost-phase intercepts will require operations in the country where the IRBM launch occurs, thus calling for a low-observable platform. Ascent- and terminal-phase intercepts will not require such platforms and should be compatible with fourth-generation fighters. A staring IRSTS can offer passive detection and tracking for a tiny fraction of the cost of a surface-based radar and could be proliferated throughout the combat air forces of both the United States and its allies. To-

gether, the small interceptor and the staring IRSTS comprise a survivable and highly flexible defensive capability that can frustrate an adversary's planning and even provide additional capabilities well beyond missile defense functions. For example, the military could design the IRSTS to perform long-range detection as well as tracking and identification of air targets, and could design the lower-tier interceptor to engage those targets at very long ranges.

Admittedly, this mission places a new demand on combat aircraft. The mission requirements of ground alert—and, in some cases, airborne persistence—as well as the possible penetration of defended airspace would impose a significant burden on today's combat air forces. In the future, aircraft like the Navy's proposed Unmanned Combat Air System could have mission durations of 100 hours and a very low radar signature, thus addressing both the persistence and penetration requirements.³⁰ However, even if the Navy pursued initial operational capability (IOC) following the current aircraft-carrier demonstration program, this capability is still more than 10 years away. In the interim, fighters remain the primary option.

Fifth-generation fighters such as the F-35 will bring with them all of the internal-sensor capability necessary to support boost-phase intercepts with both upper- and lower-tier interceptors. Our analysis indicates that the F-35's Distributed Aperture System could immediately detect and track a boosting TBM, in any direction and at any elevation from the aircraft, given a clear line of sight. Fourth-generation fighters

equipped with an IRSTS would have ascent- and terminal-phase intercept capability with both interceptors, and IOC for the lower-tier could occur as early as 2015. IOC for the upper-tier interceptor could follow in two to four years, assuming that a technology-development program soon addresses agility requirements.

In 2009 the US Air Force chief of staff and the director of the Missile Defense Agency initiated a joint study of ALHK, which found the concept technically viable and operationally feasible but deferred major decisions until after a detailed cost-benefit analysis could be conducted.³¹ To date, although the Air Force has taken the lead on this concept, everyone involved realizes that it will attain full capability only as a joint system. The additional contribution of carrier-based aviation with ALHK could offer enhanced defensive flexibility to a joint force commander, as well as even greater uncertainty to adversaries.

However, as with any new capability, ALHK comes with a significant price tag. Opportunity costs and the impact on combat flight operations demand thorough evaluation in conjunction with an examination of possible enemy countermeasures. We must model the resulting capability in a variety of future campaigns that consider a number of potential technology developments by adversaries, and we must critically assess it before making an acquisition decision. However, as we ponder whether to pursue this mission for the combat air forces, we also need to consider the long-term ramifications if we do not. ✪

Notes

1. 1st Lt Alexi A. LeFevre, "A Strategic Conversation about National Missile Defense," *Strategic Studies Quarterly* 2, no. 4 (Winter 2008): 117, <http://www.au.af.mil/au/ssq/2008/Winter/lefevre.pdf>; and Jeff Sessions, "Ballistic Missile Defense: A National

Priority," *Strategic Studies Quarterly* 2, no. 2 (Summer 2008): 22–30, <http://www.au.af.mil/au/ssq/2008/Summer/sessions.pdf>.

2. Department of Defense, *Ballistic Missile Defense Review Report* (Washington DC: United States

Department of Defense, February 2010), 15–19, http://www.defense.gov/bmdr/BMDR%20as%20of%2026JAN10%200630_for%20web.pdf.

3. George Jahn, “IAEA Fears Iran Making a Warhead,” Associated Press, 19 February 2010, http://www.boston.com/news/world/asia/articles/2010/02/19/iaea_fears_iran_making_a_warhead/.

4. Department of Defense, *Ballistic Missile Defense Review Report*, i.

5. David K. Barton et al., *Report of the American Physical Society Study Group on Boost-Phase Intercept Systems for National Missile Defense: Scientific and Technical Issues* (College Park, MD: American Physical Society, 5 October 2004), http://rmp.aps.org/pdf/RMP/v76/i3/pS1_1.

6. See Paul Zarchan, *Tactical and Strategic Missile Guidance*, 5th ed. (Reston, VA: American Institute of Aeronautics and Astronautics, 2007), 721–68.

7. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, DC: US Government Printing Office, 1993), 177, 179; and Freeman J. Dyson, *Disturbing the Universe* (New York: Harper & Row, 1979), 108, <http://books.google.com/books?id=RHzoMeU2bxsC&pg=PA108#PPA108,M1>.

8. Mohammad-Ali Massoumnia, *Q-Guidance in Rotating Coordinates*, AIAA-91-2784-CP (Reston, VA: American Institute of Aeronautics and Astronautics, 1991). This paper, written by a faculty member of the Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran, indicates that Iranians are familiar with ICBM precision-guidance techniques and are investigating their application to short-range missiles.

9. Gregory P. Kennedy, *Rockets, Missiles, and Spacecraft of the National Air and Space Museum* (Washington, DC: Smithsonian Institution Press, 1983), 20–23.

10. Eugene L. Fleeman, “Technologies for Future Precision Strike Missile Systems: Introduction/Overview,” in North Atlantic Treaty Organization, Research and Technology Organization, *Technologies for Future Precision Strike Missile Systems*, RTO Lecture Series, no. 221 (Neuilly-sur-Seine Cedex, France: North Atlantic Treaty Organization, Research and Technology Organization, 2000), <http://handle.dtic.mil/100.2/ADA387602>.

11. A Google search of “tactical surface to air missile burn times” yields a sampling of many tactical missiles, all of which have burn times of less than 20 seconds.

12. Peter J. Mantle, *The Missile Defense Equation: Factors for Decision Making* (Reston, VA: American Institute of Aeronautics and Astronautics, 2004), 85–92.

13. Zarchan, *Tactical and Strategic Missile Guidance*, 143–61.

14. Mantle, *Missile Defense Equation*, 371–81.

15. The simulation is based on Zarchan, *Tactical and Strategic Missile Guidance*, 721–68.

16. Dean A. Wilkening, “Airborne Boost-Phase Ballistic Missile Defense,” *Science and Global Security* 12 (June 2004): 2, http://www.princeton.edu/sgs/publications/sgs/pdf/12_1-2_wilkening.pdf.

17. Zarchan, *Tactical and Strategic Missile Guidance*, 721–55.

18. Thomas H. Kean et al., *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States* (Washington, DC: US Government Printing Office, 2004), 20–27, <http://govinfo.library.unt.edu/911/report/911Report.pdf>. This document discusses the response times for fighters scrambled during the terrorist attacks of 11 September 2001 (9/11). Although the open literature refers to an immediate readiness posture of 15 minutes, alert fighters typically do much better. On 9/11 the fighters from Otis Air National Guard Base, MA, were airborne in seven minutes, and the fighters from Langley AFB, VA, were airborne in six minutes.

19. Michael Leal and Philip Pagliara, “NCADE: Air Launched Boost Phase Intercept Demonstrated” (paper presented at the 2008 Multinational Ballistic Missile Defense Conference, Honolulu, HI, 10 September 2008), 3. (This document is available to the public from Raytheon.)

20. *Ibid.*, 8–12.

21. *Ibid.*, 3.

22. *Ibid.*, 7.

23. “Patriot PAC-3[ALHK],” *Deagel.com*, http://www.deagel.com/Anti-Ballistic-Missiles/Patriot-PAC-3_a001152003.aspx.

24. Barton, *Report of the American Physical Society Study Group*, 242. This document discusses the actual lethality necessary to defeat a warhead. For the comparison of kinetic energy to chemical energy, see Richard A. Muller, *Physics for Future Presidents: The Science behind the Headlines* (New York: W. W. Norton & Co., 2008), chap. 1. TNT has a chemical energy of 4.18 kilojoules per kilogram. The kinetic energy equation ($1/2$ mass times the velocity squared) shows that one kilogram of interceptor mass yields 4.18 kilojoules of energy when the closure velocity is 2.9 km/sec.

25. Zarchan, *Tactical and Strategic Missile Guidance*, 291–316.

26. Ashton Carter, undersecretary of defense for acquisition, technology and logistics, to secretaries of the military departments et al., memorandum, subject: Joint Insensitive Munitions Test Standards and Compliance Assessment, 1 February 2010.

27. Barton, *Report of the American Physical Society Study Group*, 192–97.

28. Three F-16s of the 416th Test Flight Squadron, Edwards AFB, CA, flew under contract to the Director, Advanced Technology Weapons, Missile Defense Agency, on 5 December 2008, observing the launch and entire boost phase of the ground-based mid-course defense interceptor out of Vandenberg AFB, CA, with Sniper targeting pods.

29. Eugene Fleeman, *Tactical Missile Design*, 2d ed. (Reston, VA: American Institute of Aeronautics and Astronautics, 2006), 286.

30. Thomas P. Ehrhard and Robert O. Work, *Range, Persistence, Stealth, and Networking: The Case for a Carrier-Based Unmanned Combat Air System*

(Washington, DC: Center for Strategic and Budgetary Assessments, 2008), http://www.csbaonline.org/4Publications/PubLibrary/R.20080618.Range_Persistence_/R.20080618.Range_Persistence_.pdf.

31. Marina Malenic, "Companies Await MDA Verdict on Air-Launched Hit-to-Kill Programs," *Defense Daily*, 20 August 2009, http://findarticles.com/p/articles/mi_6712/is_36_243/ai_n35676077/; and "DOD News Briefing with David Altwegg on Fiscal Year 2011 Budget for Missile Defense Agency," *Global Security.org*, 1 February 2010, <http://www.globalsecurity.org/space/library/news/2010/space-100201-dod01.htm>.



Col Mike Corbett, USAF, Retired

Colonel Corbett (BS, Oregon State University; MS, Purdue University; MS, Auburn University–Montgomery) was the Missile Defense Agency's (MDA) director for advanced technology weapons from 2006 through 2009, leading a small staff in support of kinetic- and directed-energy technology development for advanced ballistic missile defense systems. He led the Air-Launched Hit-to-Kill concept development and the feasibility and engineering assessment of integrating PAC-3-derived interceptors with fighter aircraft. He also led the MDA's evaluation of the Net-Centric Airborne Defense Element, a congressionally directed program to develop a new missile defense interceptor using an existing air-to-air missile seeker. Colonel Corbett joined the MDA in 2005 following his retirement from the Air Force. His military experience included command positions at various levels within Air Combat Command and the Air National Guard, and over 5,000 hours in a variety of aircraft, predominantly fighters.



Paul Zarchan

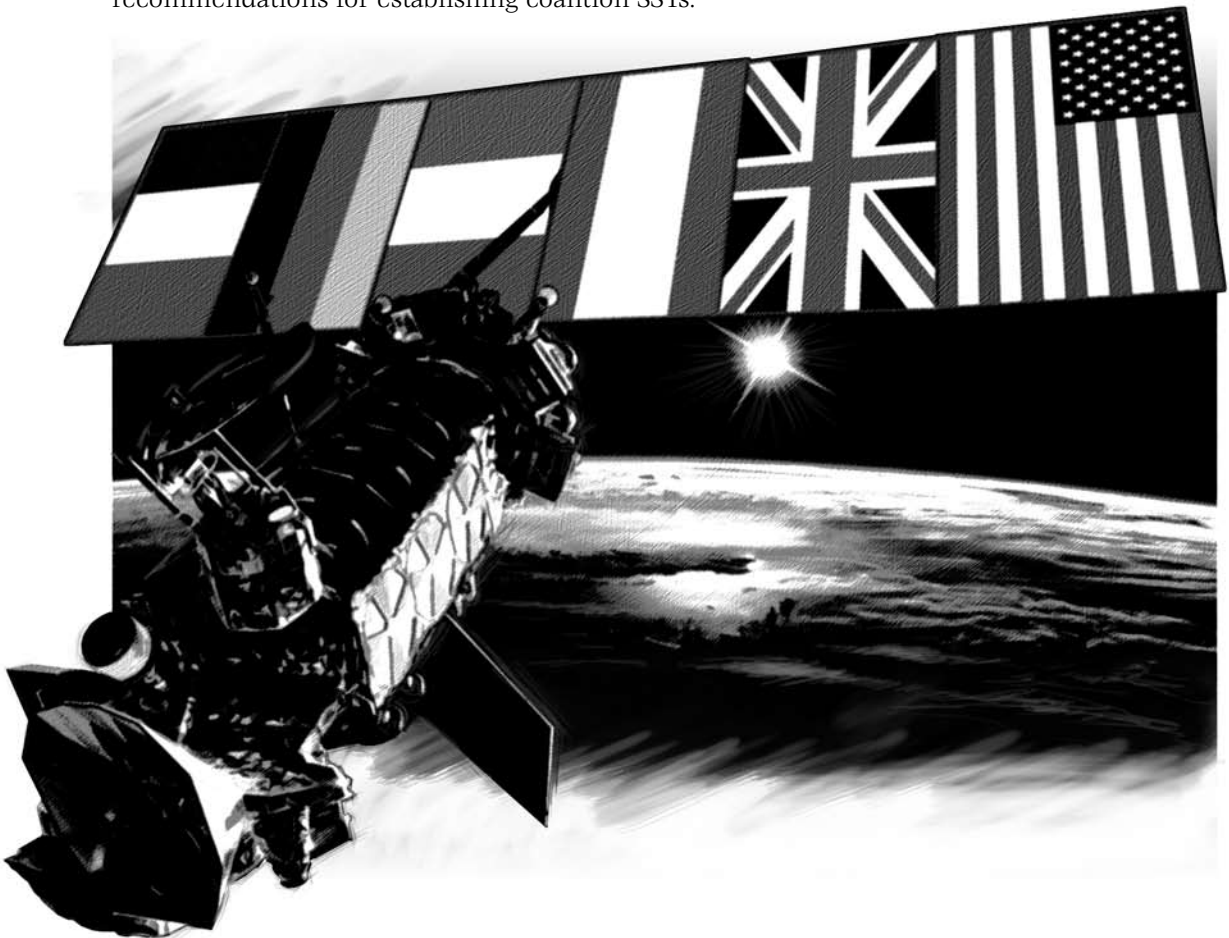
Mr. Zarchan (BSEE, City College of New York; MSEE, Columbia University) has more than 40 years of experience designing, analyzing, and evaluating missile-guidance systems. He has worked as principal engineer for Raytheon Missile Systems Division, has served as senior research engineer with the Israel Ministry of Defense, and was a principal member of the technical staff for C. S. Draper Laboratory. Currently a member of the technical staff at MIT Lincoln Laboratory, Mr. Zarchan is working on problems related to missile defense. He is the author of *Tactical and Strategic Missile Guidance*, fifth edition, an American Institute of Aeronautics and Astronautics (AIAA) text, and coauthor of *Fundamentals of Kalman Filtering: A Practical Approach*, third edition, another AIAA text. Mr. Zarchan is associate editor of the *Journal of Guidance, Control and Dynamics*.

New Horizons

Coalition Space Operations

Lt Col Thomas G. Single, USAF

To provide a current picture of space power in the North Atlantic Treaty Organization (NATO), in January 2009 the Joint Air Power Competence Centre published *NATO Space Operations Assessment*, which recommends 23 ways to improve NATO's integration of space into military operations.¹ The NATO-led International Security Assistance Force (ISAF) in Afghanistan, which faces significant challenges, exemplifies the need to conduct coalition space operations. Performing combined and joint air, land, sea, and special operations, the ISAF finds itself in the early stages of integrating national space capabilities, critical enablers to operations that require the leveraging of all available resources. One means of integration involves establishing coalition space support teams (SST), but in order to conduct space operations with these teams, we must address matters of doctrine, presentation of forces, education, training, and equipment. This article offers some thoughts and recommendations for establishing coalition SSTs.



Historical Perspective

Operation Desert Storm is generally accepted as the first space war even though the military developed and used space capabilities long before that conflict.² To put these capabilities into historical perspective, we need to go back to Vietnam and the Cold War. For example, Corona, the United States' first photo reconnaissance satellite system, operated from August 1960 to May 1972.³ Also in 1960, the US Navy tested the five-satellite Transit, the first satellite navigation system, which could generate a navigational fix four to six times a day.⁴ The first Missile Defense Alarm System satellite, designed to serve as a space-based early warning system for ballistic missile launches from the Soviet Union, became operational in 1963.⁵ Following that system was the Defense Support Program, developed to detect missile or spacecraft launches and nuclear explosions by picking up infrared emissions. The Defense Meteorological Satellite Program began providing cloud-cover information in the mid-1960s, allowing more precise planning of air missions in Vietnam.⁶ In 1970 the United States launched its first signals intelligence satellite.⁷ The more commonly known global positioning system first launched in 1978, reaching initial operational capability in 1993.⁸ Even though the United States has operated these and other satellites for more than 50 years, only recently did we fully integrate their capabilities into combat operations.

Allied Space Capabilities

Our coalition partners can now employ a variety of space assets. France became the third recognized space power, after the Soviet Union and the United States, when it launched its first satellite in 1965.⁹ The French now operate satellites for communi-

cations, electro-optical, infrared, signals intelligence, and electronic intelligence; they should field an early warning system by 2020.¹⁰ Italy and Germany have also become players in the space defense sector, Italy launching its first communications satellite in 2001 and the first of four synthetic aperture radar (SAR) satellites in 2007.¹¹ Germany launched a constellation of six SAR satellites from 2006 to 2008 and will add another in 2010; moreover, it launched five medium-resolution electro-optical satellites in 2008.¹² The Germans have also developed two communications satellites, one on orbit and the other scheduled for launch in 2010.¹³ Other military satellite communications (SATCOM) programs in Europe include the United Kingdom's Skynet and Spain's Hisdesat satellites. The European Union's Galileo program will provide a global positioning, navigation, and timing (PNT) capability. Clearly, the Europeans have much to offer.

In addition to technology and hardware, our coalition partners offer trained space personnel. Many nations have studied our space doctrine and are quickly catching up. The French have set a goal of fostering a military space culture across the European Union. A French Joint Space Command will likely stand up in the summer of 2010—a major step forward.¹⁴ In 2008 Germany announced that it would establish a Space Situational Awareness Center in Uedem, Germany.¹⁵ The Royal Air Force has a Space Operations Coordination Centre in High Wycombe.¹⁶ Spain placed a European Union Satellite Centre in Torrejón.¹⁷ As the space capabilities of European nations continue to grow, the expertise of those countries will develop. Additionally, other states such as Japan, India, and Australia are acquiring their own space capabilities. Integration of such allied resources could allow the rapid reconstitution of lost capability, add capability, decrease revisit times, and so on. Al-

lied space personnel offer strength through diversity by bringing to the table a different cultural perspective. Experts in their space systems and organizations, they have different understandings of and solutions to the geopolitical environment. Although the United States would greatly benefit from increased partnerships with the growing number of space personnel, this relationship will demand changes to the way we currently operate.

Why a Coalition Team?

Coalition operations are not new. Nations formed alliances to fight the two world wars, Korea, Vietnam, the Balkans, Iraq, and Afghanistan. War fighters in US Central Command's area of operations conduct joint and combined operations. Nations such as Afghanistan, Australia, Belgium, Canada, Germany, Iraq, Italy, France, the Netherlands, and the United Kingdom all participate in flying operations with the United States. In addition to providing international political support and sharing risks, resources, and costs, a coalition establishes legitimacy in the international community. A complex undertaking, modern warfare includes diplomatic, political, social, economic, informational, and military aspects, not to mention staggering costs that few nations can afford for an extended time. Our economies and governments have become inexorably intertwined in the international arena. Most importantly, sending troops afield requires political support both at home and abroad. The benefits of common security concerns, the dialogue and cooperation essential to a coalition, and the shared culture and understanding greatly outweigh any day-to-day challenges. Undoubtedly, nations will continue to organize themselves in coalitions to wage war.

Unfortunately, NATO, the ISAF, and most nations have neither adequately addressed space as a domain nor fully leveraged space capabilities. Coalition forces need space-based intelligence, surveillance and recon-

naissance (ISR), SATCOM, global PNT, tracking of friendly forces, space control, environmental (weather) monitoring, and missile-warning capabilities. Generally speaking, these space capabilities emerged because of their cost-effectiveness or because the high ground of space represented the only feasible place for their employment. Current coalition operations require vast amounts of communications, imagery, intelligence, and information, which partner nations must share. The NATO-led ISAF in Afghanistan faces challenges because the sharing of intelligence and information cannot always occur at a common classified or unclassified level. Procedures for requesting, tasking, processing, exploiting, and disseminating intelligence are difficult at best. Problems arise with regard to technology as well as policy, data management, and sharing. We must use all of our available resources optimally because the ISAF can greatly benefit from space capabilities. Informational seams, such as the inability to share a critical piece of intelligence, reduce our operational effectiveness. Arguably our operational paradigm must change in the space community. Because we fight as a coalition team, we must include space. Products and services classified Top Secret just a few years ago are now unclassified and available from commercial companies. Therefore, we should take a critical step towards overcoming these challenges by integrating the space capabilities of our coalition partners.

The evolution of space integration in the United States can serve as a model for developing coalition space operations. As the United States cultivated space capabilities, it had to address integration, policy, doctrine, and the development of trained personnel. Doctrine has evolved over the years, training courses have emerged and changed, and a space career field has appeared. The United States now has a space cadre with combat experience in Iraq and Afghanistan—a cadre mature enough to include general officers who have spent most of their careers in space assignments. Pre-

senting forces, which remains a topic of debate between the Air Force and Army, will continue to adapt as America involves itself in coalition operations. As other nations and organizations, such as NATO, begin to think about space capabilities, they must consider how they can develop space forces and integrate them into coalition operations. Other nations can use the US space-integration construct to build a force structure that can conduct space operations within a coalition.

Training and Doctrine

The most difficult problem the Air Forces faces in integrating space is how to create an air and space officer to employ an air and space force.

—Lt Col Mark P. Jelonek,
Toward an Air and Space Force, 1999

Having space systems does not necessarily mean that our war fighters are using them; rather, we must integrate system capabilities into the fight. To develop a coalition's space capability, we would do well to learn lessons from the evolution of US space training and doctrine. For many years, the United States struggled to integrate and fully exploit highly classified and compartmented space systems. One solution entailed the establishment of space teams, much like coalition SSTs. US Space Command's joint SSTs, established in the mid-1990s, and their associated component SSTs served theater commanders and joint task forces, making space capabilities understandable and useful for warfare.¹⁸ In 1995 the Air Force formed the 76th Space Operations Squadron to assist air component commanders' understanding and application of space capabilities in support of air operations.¹⁹ These Air Force SSTs, designed to support the air operations center (AOC) and the tactical level of war, deployed to assist in Operations Joint Endeavor, Deny Flight, Desert Fox, Desert Thunder, and Allied Force.²⁰

The United States possessed significant space capabilities, but Desert Storm taught senior leaders that we had not fully leveraged them. This situation led to formation in 1994 of the Space Tactics School, which became the US Air Force Weapons School's Space Weapons Instructor Course in 1996.²¹ The course has produced 215 graduates, eight of whom have now reached the rank of colonel.²² These space weapons officers, who assisted regional combatant commanders and became part of the AOCs, supported the joint force air component commander (JFACC) by providing space expertise and effects. Their success showed the Air Force the value of such embedded expertise.

By the end of 2000, the Air Force had begun to integrate space personnel throughout the combat air forces and ended the joint and Air Force SSTs. More recently the service established a position for the director of space forces, who advises the combined force air component commander and coordinates space requirements and effects for the theater. As part of the commander's staff, the director must rely on the embedded space operators in the various AOC divisions and throughout the area of operations to gather requests for effects and to integrate space into daily operations. This method has proven effective for operations in US Central Command; however, the Army has not adopted the director's doctrinal construct and continues to field SSTs. The Navy and Marine Corps have a small number of personnel with specialized expertise in space operations, but neither service fields space teams.

Primarily, the Army integrates space by means of its SST and the space support element (SSE), the former a deployable team of six Soldiers and the latter a smaller cell of typically two or three personnel assigned to a brigade or division headquarters.²³ Army SSTs began deploying in 1995 to make space a part of ground operations.²⁴ In 1998 the Army established Functional Area 40 (FA-40) (a space operations officer) as a mechanism for training and developing space specialists.²⁵ Both the Army SST and

SSE are responsible for coordinating space activities and synchronizing space mission-area activities throughout the operations and planning processes.

These teams and elements, which have proven successful in Iraq and Afghanistan, continue their high deployment and operations tempo. Embedding such space expertise in the combined joint task force (CJTF) structure ensures that space capabilities and effects are part of planning and that they support operations. Unfortunately, very few Air Force personnel have deployed to integrate space into ground operations. The service must do a better job of placing these individuals with units that use space-based services. A more joint approach would allow our forces to understand and make optimal use of space capabilities.

In terms of space, the fundamental doctrinal difference between the Air Force and Army is that the Air Force is primarily a *provider* of capabilities while the Army is primarily a *user*. Coalition operations require both providers and users. The Air Force established positions to command, control, and integrate space, whereas the Army fielded teams to exploit and utilize space-based services. For example, to improve air-land integration, the Air Force embeds air liaison officers and tactical control parties—experts on employing airpower—with Army forces. They coordinate communications and aircraft for precision air strikes. However, the Air Force has yet to establish space-operations liaison officers for the purpose of integrating its space capabilities into ground operations. As we look to the future of conducting combined space planning and operations, we must examine and modify US space-integration models in order to effectively include not only our other services but also those of our allies.

It is important to understand established space doctrine and to determine if we must adapt it to guide the conduct of coalition space operations. The United States has the most developed space doctrine of any NATO nation, having updated its joint space doctrine in 2009, Air Force doctrine in 2006,

and Army doctrine in 2005, as well as having implemented Navy space policy in 2005.²⁶ NATO has been active as well, publishing its doctrine document for air and space operations in 2009.²⁷ The European Union published a space policy in 2007.²⁸ Australia, Great Britain, Holland, France, Germany, and other nations are developing or have recently established national space policy and doctrine. Unfortunately, no country has adequately captured the space-related realities of coalition operations in Afghanistan. An examination of questions about why US doctrine would have to change to support coalition space operations lies beyond the scope of this article, but we should address a few key points to understand what we need for coalition space teams. As other nations produce space capabilities, personnel, and centers, US doctrine will have to address the construct of those relationships and the means of interacting with them. For example, because the French now field a space team of three personnel to support their rapid-reaction forces and AOCs, we need to think in terms of developing a common framework, definitions, and mission areas.²⁹ The following discussion addresses concepts for establishing a foundation for coalition space operations.

Current US and NATO space-mission areas include *space-force enhancement*, *space control*, *space support*, and *force application*.³⁰ These terms have been in use for some years now and need revising (except for *space support*, which is still applicable). No longer simply an enhancement of our operations, space has become a critical joint enabler. Space control is often confused with offensive counteroperations, which aim to dominate enemy airspace and prevent the launch of air threats. The latter can include destroying the enemy's air and surface-to-air forces, interdicting his air operations, protecting air lines of communications, and establishing local military superiority in air operations.³¹ Additionally, other nations consider the term *space control* much too aggressive and offensive in light of the intended peaceful use of space. No

Table 1. Proposed mission areas for space operations

<i>Joint* Support Space Operations</i>	<i>Counterspace Operations</i>	<i>Space Support Operations</i>
Position, Navigation, and Timing	Space Situational Awareness	Launch and Range Operations
Satellite Communications	Offensive Counterspace	Satellite Operations
Intelligence, Surveillance, and Reconnaissance	Defensive Counterspace	Command and Control of Space Forces
Missile Warning		Operational Test and Evaluation
Environmental Monitoring		Space Professional Development
Integration and Exploitation		

*The NATO term *joint* equates to the US term *combined*.

country wants to see US forces controlling space. Similarly, other nations find the term *force application*, which translates to weaponizing space, too politically sensitive and therefore unnecessary. The force-application mission makes other nations suspect that the United States has secretly placed weapons in space; otherwise, why would we have doctrine for weapons that don't exist? Since those countries study our doctrine, we need to be careful about the message it sends.

We need a new construct for US and NATO space-mission areas, including joint support space operations, counterspace operations, and space support operations (table 1). This construct would make the space-mission areas easier to understand and more accurately reflect actual operations. For example, joint support space operations would include PNT, SATCOM, ISR, missile warning, and environmental monitoring because they all directly support joint force operations. We should add one area not currently included in force enhancement—integration and exploitation. Some existing cross-functional programs in the space portfolio do not fit under a specific capability area. Additionally, the absence of integration and exploitation in the doctrine compromises any advocacy for funding or programs that we need most—specifically, those that use space capabilities to support the joint war fighter. As discussed above, coalition space doctrine should not mention *space control*; *counterspace* is a better term. Finally, we need add

only *space professional development* to *space support operations* and omit *force application*, as mentioned above.

Drawing on these proposed mission areas, we can envision a notional structure for a coalition space team (table 2). Sized appropriately for the assigned mission, teams would have expertise in ISR, PNT, SATCOM, missile warning, space situational awareness, offensive counterspace, and defensive counterspace. Army SSTs and SSEs have benefited from training and deploying as integral units. Attempting to make these teams multinational presents certain challenges in terms of organizing, training, and equipping forces.

Table 2. Composition of a typical space team

<i>Position</i>	<i>Rank</i>
Space Coordination Element	
Senior Space Operations Planner	O-5
Space Operations Planner	O-4
Space Support Team	
Space Team Leader	O-4
Operations Officer	O-3
Counterspace Operations Planner	O-3 or E-6
Space Operations Planner	O-3 or E-6
Intelligence Analyst	E-6
Information Systems Operator	E-5
Space Support Element	
Senior Space Operations Officer	O-4
Space Operations Officer	O-3

Presentation of Forces

Using the proposed mission areas, we have to consider how the United States should present its space forces in-theater. Current US doctrine has Air Force personnel embedded in AOCs. The Army's SSEs are an integral part of its divisions, and Army SSTs deploy to augment CJTFs when needed. NATO doctrine addresses space operations only at a high level and does not offer guidance on presenting space capabilities or forces.³² Furthermore, US joint doctrine only briefly addresses space in multinational operations.³³ Since the beginning of operations in Afghanistan, we have had no strategic plan to integrate space personnel, but the ISAF is developing an architecture to make better use of space capabilities. At the NATO joint level, two space officers are assigned to the ISAF Joint Command, including the chief of ISAF space operations—the force's senior space officer. At the regional level (which corresponds to the service-component level in US doctrine), Army SSTs are assigned to ISAF Regional Commands East and South headquarters. US Marines in Regional Command South-west also have an assigned Army SST. Additional space personnel have been requested to support Regional Commands North and West. Unfortunately, the ad hoc nature of requests for space personnel over the past eight years has resulted in confusing command relationships and, for some, organizations lacking individuals with space expertise.

Our experience in Afghanistan recommends the following two-phased construct for integrating space into a multinational CJTF. Space must first find representation at the US joint level, in J-3 (operations) and J-5 (plans). Additionally, assuming the presence of a JFACC, we must continue to integrate space into the AOC because of the center's status as the command and control, planning, and execution node for air operations. The JFACC, also typically the commander of Air Force forces (COMAFFOR), should have space officers in A-3 (operations) and A-5 (plans). We can continue the

current US Army structure for integrating space teams into land forces.³⁴ Each component command (and regional command in the ISAF) should have a coalition SSE at headquarters. Subordinate headquarters at the corps level would have a coalition SST. Since each service brings its own expertise and capabilities, the space teams/elements need joint manning. It is important to note that the number of teams and personnel depends on mission requirements and operations tempo. Team size and composition should be scalable to meet operational needs. For example, perhaps only a single space officer, rather than a full space team, would suffice for coordination.

The second phase will call for integrating coalition partners (fig. 1). Team integrity, training, and access to classified information must become a consideration, and higher headquarters will include multinational personnel. The tactical level is the most difficult place to integrate such personnel because they require detailed operational and system knowledge to perform their mission. Because formation of a multinational SSE or SST would prove difficult, this article recommends assignment of a national SSE to support its country's forces. Some of the teams could be multinational, depending on bilateral or multilateral security arrangements. We must also address assigned space units, which fall under the COMAFFOR as expeditionary space operations squadrons. Even so, they could be assigned to other commanders or components. Due to the political and strategic nature of space assets, these units would most likely have to report directly to their national authorities for guidance regarding rules of engagement. The command relationships would be developed, based on national direction and the mission. For the most part, we have integrated mature space capabilities into daily operations and have normalized them. Intelligence teams plan and execute the use of space-based ISR assets, and the communications team runs SATCOM. However, we still need some space specialists in strategic-

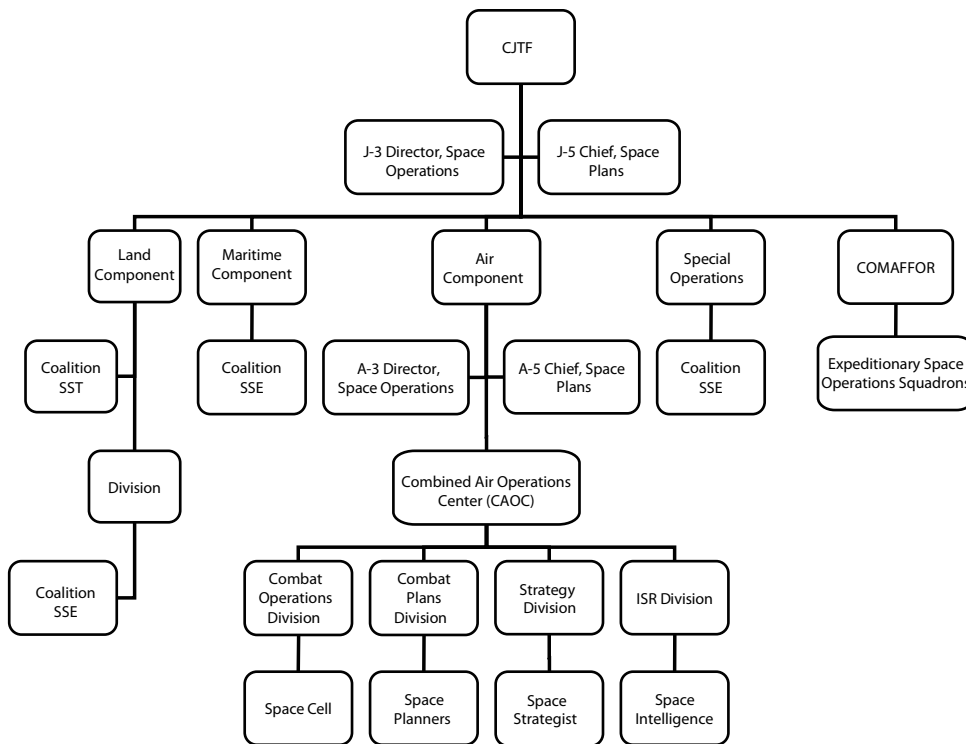


Figure 1. Structure of a notional combined joint task force

and operational-level positions. Consequently, this example does not require a director of space forces because of the full assimilation of space positions into the command structure.³⁵

Space Support and Reachback

Soon after the start of the Schriever V war game of 2009, it became apparent that an integrated force structure would facilitate coordination for coalition operations.³⁶ This realization led to establishment of a CJTF-like organization and a combined space operations center construct. Building on this concept, we can think of designing a notional space support architecture for a coalition (fig. 2).

CJTF space forces must integrate effects and support the mission, perhaps via reach-

back to a space operations coordination center (SpOCC). Typically, the CJTF commander will designate a single focal point for space—logically, the JFACC and combined air operations center (CAOC). As the supported multinational command, the CAOC would enjoy direct support from the coalition SpOCC, which can serve as a virtual coordination center since a designated lead nation’s SpOCC would become the coalition center. National SpOCCs can also directly support the coalition SpOCC. It would be wise for the CAOC to have arrangements with national SpOCCs for time-critical support. National space teams would have reachback via national command authorities and support channels. For example, space personnel supporting operations in US Central Command go the CAOC, which can then reach back to US Strategic Com-

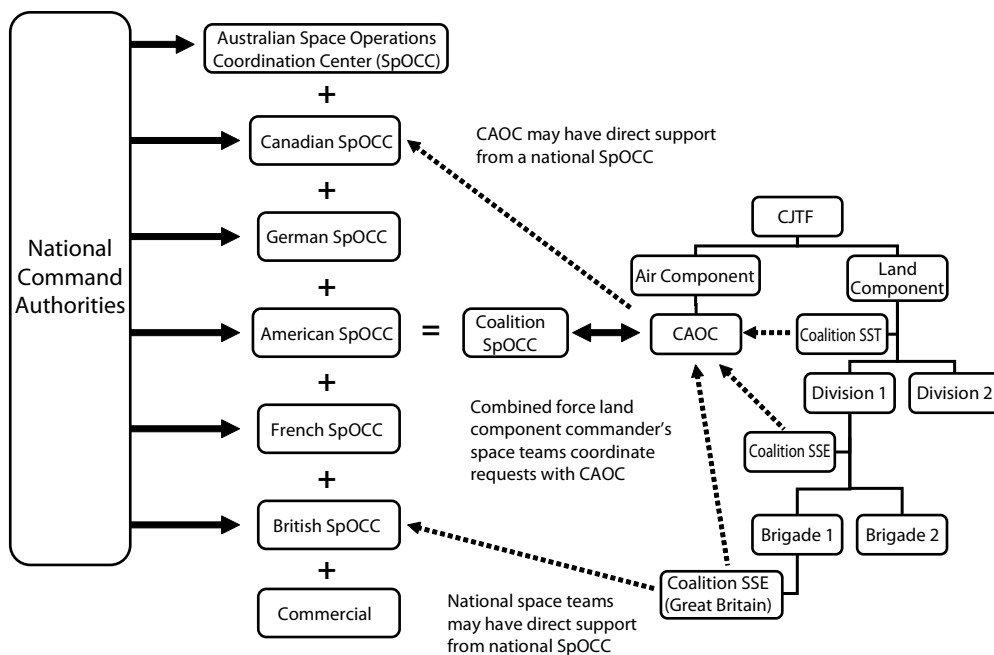


Figure 2. Notional space support architecture

mand's joint functional component commander for space and the joint space operations center.

Coalition operations require some nations to provide space capability, often both military and commercial satellite services. Consequently, each national SpOCC would have to maintain its own space picture and share some of that data with the coalition SpOCC to generate an integrated picture. Each SpOCC could serve as a central point of contact to access national space capabilities. National command authorities would maintain control of their national assets while providing an agreed-upon space capability or service to coalition operations. Doing so requires that we put in place agreements today to begin developing guidance for security classification, interoperable information networks, tasking and dissemination processes, and so on. Because this construct will probably take years to develop, we cannot afford to wait for a crisis to occur.

Education and Training

Often an afterthought, education and training are paramount to success. Too frequently we have sent space operations personnel into combat with inadequate experience and training. It is vital to properly organize, train, and equip our space forces. Although the United States has made improvements to develop space professionals, we need specialists. During the last decade, space weapons officers have filled this role. Because the position is adapting to focus more on Air Force Space Command units and because of the limited number of positions, the Air Force needs to develop a track for personnel specializing in the integration and exploitation of space. Either the Army's FA-40 program or the Air Force Space Weapons Instructor Course can serve as models. Most nations have neither military space systems nor military space specialists, so they must develop personnel with space expertise and establish a career specialty.

Because coalition space teams require trained personnel, partner nations must establish training programs to develop specialists who can integrate space into ground, air, and sea operations.

Before developing a specialty, we must clearly understand the operational requirements for space capabilities. Army Field Manual 3-14, *Space Support to Army Operations*, May 2005, clearly defines the roles and tasks of an Army SST and a space operations officer.³⁷ We have high expectations for deployed space personnel, who must know all of the national space systems, capabilities, limitations, and supporting organizations; understand the CJTF's mission, priorities, and operations; and then figure out how to integrate them into the planning process. They must coordinate with a multitude of intelligence and space organizations, monitor the status of space systems for changes, determine possible effects on the theater, and track vulnerabilities and threats. Theater space officers may also perform other classified duties. In a coalition environment, they will carry out these duties for other nations' space assets and processes. After training and developing senior captains and majors to best support our theater commanders, the Air Force must groom these officers for more advanced positions. Therefore, to meet the above requirements, we should organize a small cadre of US joint and allied space planners and liaison officers.

Several existing training programs can begin to address these needs. As one would suspect, the United States offers the majority of space training. However, Canada, the United Kingdom, France, and NATO also have space courses. Selecting the best aspects of each of them should enable us to develop the requisite courses. Because joint and allied commanders and operational planners need a basic awareness of space capabilities and limitations, staff colleges and other advanced schools should include space familiarization in their curricula. Similarly, senior political and military leaders would benefit from an executive space

course that covers strategic space issues, just as commanders and staffs would profit from a course on military applications of space. NATO members should have access to such courses at a reasonable cost. Furthermore, at the more advanced level, the NATO school in Germany offers the only operational planning course for space, which attempts to teach staff officers and operational planners with little or no space background how to integrate space into the operational planning process in just five days—simply not enough time. Indeed, the basic and advanced training that students need could take months. Without proper education and training, we will continue to provide only adequate rather than optimal support to our theater commanders.

Equipment and Planning Tools

We can't send our space warriors into the fight without tools. For situational awareness, teams must have an integrated space picture—including US, coalition, adversary, and commercial space assets—similar to the information about our land, sea, and air forces. We must monitor and display system and network status and assess effects on the theater. Teams must have planning and coordination tools so they can share information at a common classification level in a coalition environment. Chat programs, e-mail, and phone networks must be interoperable and allow sharing amongst coalition nations. Computer systems should be capable of handling information up to at least a Secret classification. (The removal of sources, means, and methods permits the release of most intelligence information and products.) In order to move forward, we must produce fused intelligence products, and many nations must contribute to that process. Most importantly, because all coalition forces must be aware of available capabilities and products, the United States should no longer confine itself to national systems but begin operating on coalition network systems.

Space personnel also need certain types of equipment. Army SSTs, for example, have their own deployable SATCOM terminals and computers with which they can obtain or produce space products such as three-dimensional visualizations, satellite-overflight reports, communication-interference reports, and imagery maps. Using satellite connectivity, they can monitor the space environment, operational status of space vehicles, effects of solar weather, and other space events. They also can serve as a primary missile-warning node. However, these US teams are not ideally enabled for coalition operations because they cannot release many of their products to partner nations. In addition to having an integrated space picture, a coalition SST must be able to produce satellite-overflight predictions, analyze communications links, analyze and manage ISR resources, assess threats, and conduct electronic warfare/countercommunications planning, as well as perform many other tasks. Hence, they need deployable SATCOM capability, not to mention information systems and software to support operations, the latter including such products as the widely used Satellite Toolkit from Analytical Graphics, which can help coalition SSTs do their jobs.³⁸ Commanders cannot fight without knowing the location and status of their aircraft, ships, and land forces at any given time; consequently, coalition nations must

contribute orbital information, aircraft information, and data to create an integrated picture. Sadly, the current state of a coalition's space situational awareness is minimal at best.

Conclusions

During the past 15 years, the United States has experimented with, developed, and fielded space forces to support theater commanders. Capabilities and personnel have matured and have more jointness than before, but today's coalition operations demand that we better integrate space capabilities into the fight. Recently, some allied nations have developed their own space capability. It is now time for the next step: coalition space operations. Thus, we must address doctrine, organization, command and control, education and training, equipment and tools, as well as our bilateral agreements for space cooperation, which do not suffice for coalition space operations.

Ongoing coalition operations in Kosovo, Iraq, Afghanistan, and elsewhere motivate us to better integrate and use all available space capabilities. Improving the way we organize, train, and equip our forces will enhance the space effects available to joint and coalition war fighters. Space is for everyone, including our adversaries, so we mustn't delay. ☛

Notes

1. The Joint Air Power Competence Centre was established in 2005 as a Centre of Excellence to enable NATO's effective and efficient use of joint air and space power. A think tank, the center offers independent thought, analysis, and solutions at the strategic and operational levels. Maj Thomas Single, *NATO Space Operations Assessment*, rev. ed. (Kalkar, Germany: Joint Air Power Competence Centre, January 2009), I-II.

2. Dr. Benjamin S. Lambeth, "The Synergy of Air and Space," *Airpower Journal* 12, no. 2 (Summer 1998):

7, <http://www.airpower.au.af.mil/airchronicles/apj/apj98/sum98/lambeth.pdf> (accessed 17 February 2010).

3. "Corona Facts," National Reconnaissance Office, <http://www.nro.gov/corona/facts.html> (accessed 17 February 2010).

4. Stanford University News Service, "A Brief History of Satellite Navigation," 13 June 1995, <http://news.stanford.edu/pr/95/950613Arc5183.html> (accessed 15 March 2010).

5. Jeffrey Richelson, "Space-Based Early Warning: From MIDAS to DSP to SBIRS," National Security Archive Electronic Briefing Book no. 235, 9 Novem-

ber 2007, <http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB235/index.htm> (accessed 17 February 2010).

6. Steven R. Strom and George Iwanaqa, "Overview and History of the Defense Meteorological Satellite Program" *Crosslink* 6, no. 1 (Winter 2005): 11–15, <http://www.aero.org/publications/crosslink/pdfs/V6N1.pdf> (accessed 17 February 2010).

7. Maj A. Andronov, "American Geosynchronous SIGINT Satellites" [trans. Allen Thomson], *Zarubezhnoye voyennoye obozreniye*, no. 12 (1993): 37–43, <http://www.globalsecurity.org/space/library/report/1993/androart.htm> (accessed 17 February 2010).

8. "Global Positioning System (GPS)," JPL Mission and Spacecraft Library, <http://msl.jpl.nasa.gov/Programs/gps.html> (accessed 17 February 2010).

9. "First Satellites Launched by Spacefaring Nations," *Space Today Online*, <http://www.spacetoday.org/Occurrences/OtherOccurrences.html> (accessed 17 February 2010).

10. Peter B. de Selding, "France Prepared to Go It Alone on Missile Warning System," *Space News*, 19 February 2009, http://spacenews.com/archive/archive09/spirale_0216.html (accessed 17 February 2010).

11. "Sicral," *Deagel.com*, http://www.deagel.com/C3ISTAR-Satellites/Sicral_a000214001.aspx (accessed 18 February 2010); and "COSMO-SkyMed," Telespazio, <http://www.telespazio.it/cosmo.html> (accessed 18 February 2010).

12. Germany launched five "SAR-Lupe" satellites from 2006 to 2008. See "SAR-Lupe," OHB System, <http://www.ohb-system.de/sar-lupe-english.html> (accessed 17 February 2010). Germany also launched the TerraSAR-X satellite in 2007. The TanDEM-X SAR satellite is scheduled for launch in 2010. See "TanDEM-X: A New High Resolution Interferometric SAR Mission," DLR, http://www.dlr.de/hr/desktopdefault.aspx/tabid-2317/3669_read-5488/ (accessed 18 February 2010); and "Launch 2008," RapidEye, <http://www.rapideye.de/home/system/launch-2008/index.html> (accessed 18 February 2010).

13. "SatComBw/ComSatBw-2," EADS Astrium, <http://www.astrium.eads.net/en/prog/satcombw-comsatbw2.html> (accessed 16 April 2010).

14. Gerard Petitalot, "French MilSpace—The Next 10 Years" (presentation at MilSpace 2009 conference, Paris, France, 28 April 2009), http://www.smi-online.co.uk/event_media/programme.asp?is=1&ref=3058&day=2 (see "Day 2," "Host Nation Closing Address") (accessed 16 April 2010).

15. "Sicherheit aus dem Weltall," *RP Online*, 7 February 2008, http://www.rp-online.de/niederrheinord/kleve/nachrichten/kalkar/Sicherheit-aus-dem-Weltall_aid_529941.html (accessed 18 February 2010); and Col Herold Borst, German Air

Force, Space Situation Centre, Uedem, Germany, site visit by the author, August 2009.

16. Tim Ripley, "UK Plans Opening of Space Operations Co-ordination Centre," *Jane's Defence Weekly*, 31 March 2008, <http://www.janes.com/articles/Janes-Defence-Weekly-2008/UK-plans-opening-of-Space-Operations-Co-ordination-Centre.html> (accessed 16 April 2010).

17. "European Union Satellite Centre," <http://www.eusc.europa.eu/> (accessed 17 February 2010).

18. CAPT George E. Slaven Jr., USN, "What the Warfighter Should Know about Space: A Report on US Space Command Joint Space Support Teams," research report (Maxwell AFB, AL: Air War College, 1997), 8–10, <http://handle.dtic.mil/100.2/ADA399180> (accessed 8 April 2010); and UMD 38-2, *Manpower and Organization: Space Support Team Operations*, 2 January 1996, http://www.fas.org/spp/military/docops/usspac/md38_2.htm (accessed 17 February 2010).

19. The 76th Space Operations Squadron was redesignated the 76th Space Control Squadron in 2001. "76th Fighter Squadron (AFRC)" Air Force Historical Research Agency, <http://www.afhra.af.mil/factsheets/factsheet.asp?id=13868> (accessed 16 April 2010); and Lt Col Tom Meade, "76th Space Operations Squadron," *Space Tactics Bulletin* 3, no. 1 (Winter 1995): 14.

20. "The 76th Space Control Squadron," 23d Flying Tiger Association, <http://www.flyingtiger.org/files/squadrons/76th/now.html> (accessed 15 March 2010).

21. Scott F. Large, "National Security Space Collaboration as a National Defense Imperative," *High Frontier* 4, no. 4 (August 2008): 5, <http://www.afspc.af.mil/shared/media/document/AFD-080826-020.pdf> (accessed 8 April 2010).

22. Maj Jason Schramm, HQ AFSPC/A3TW, interview by the author, 17 February 2010.

23. US Army Field Manual (FM) 3-14, *Space Support to Army Operations*, 18 May 2005, 1-16, C-2, <http://www.fas.org/irp/doddir/army/fm3-14.pdf> (accessed 8 April 2010).

24. Lewis Bernstein, "Army Space Support Teams: The Early Years, 1986–1998," *Army Space Journal* 4, no. 1 (Winter 2005).

25. *Ibid.*, 1F–3F.

26. See Joint Publication (JP) 3-14, *Space Operations*, 6 January 2009; Air Force Doctrine Document (AFDD) 2-2, *Space Operations*, 27 November 2006; FM 3-14, *Space Support to Army Operations*, May 2005; and OPNAVINST 5400.43, *Navy Space Policy Implementation*, 20 May 2005.

27. Allied Joint Publication (AJP) 3.3, *Air and Space Operations*, November 2009.

28. Council of the European Union, *Presidency Report on ESDP [European Security and Defense Policy]*, 18 June 2007, <http://register.consilium.europa.eu/pdf/en/07/st10/st10910.en07.pdf> (accessed 8 April 2010); and Council of the European Union, "4th Space Council Resolution on the European Space Policy," 22 May 2007, http://www.gmes.info/pages-principales/library/reference-documents/?no_cache=1&download=Resolution_EU_Space_Policy.pdf&did=65 (accessed 8 April 2010).

29. Lt Col Gérard Brunel, French Air Force, Centre of Analysis and Simulation for the Preparation of Air Operations, NATO Space Course briefing, subject: French JFACC Organisation, November 2009.

30. AFDD 2-2, *Space Operations*, 4-5.

31. The United States defines space control as "operations to ensure freedom of action in space for the US and its allies and, when directed, deny an adversary freedom of action in space. The space control mission area includes: operations conducted to protect friendly space capabilities from attack, interference, or unintentional hazards (defensive space control); operations to deny an adversary's use of space capabilities (offensive space control); supported by the requisite current and predictive knowledge of the space environment and the operational environment upon which space operations depend (space situational awareness)." JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 31 October 2009), 501, <http://www.dtic.mil/doctrine/>

[new_pubs/jp1_02.pdf](http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf). For an overview of air superiority as well as offensive and defensive counterair operations, see JP 3-01, *Countering Air and Missile Threats*, 5 February 2007, chap. 1, http://www.dtic.mil/doctrine/new_pubs/jp3_01.pdf.

32. AJP 3.3, *Air and Space Operations*, chap. 6.

33. JP 3-14, *Space Operations*, IV-18 and V-10; and JP 3-16, *Multinational Operations*, 7 March 2007, III-25/26.

34. FM 3-14.10, *Space Brigade Operations*, October 2007, chap. 2.

35. AFDD 2-2, *Space Operations*, describes the position of director of space forces; JP 3-14, *Space Operations*, addresses space coordination authority; and JP 0-2, *Unified Action Armed Forces*, 10 July 2001, examines coordination authority. All three documents suggest that the director and space coordination authority are more appropriate for planning than for combat operations.

36. Joseph D. Rouge and Dennis L. Danielson, "Coalition Space Operations: Lessons Learned from Schriever V Wargame," *High Frontier* 5, no. 4 (August 2009): 28, <https://newafpims.afnews.af.mil/shared/media/document/AFD-090827-008.pdf> (accessed 8 April 2010).

37. FM 3-14, *Space Support to Army Operations*, chap. 3 and appendixes C, D.

38. The author neither represents nor endorses this company. For information about products from Analytical Graphics, see <http://www.agi.com>.



Lt Col Thomas G. Single

Lieutenant Colonel Single (BS, Worcester Polytechnic Institute; MBA, Regis University; MS, Air Force Institute of Technology) is an air and space strategist at the Joint Air Power Competence Centre in Kalkar, Germany. He serves as the center's space operations subject-matter expert, responsible for developing air and space power for the North Atlantic Treaty Organization (NATO) and member nations. He is currently deployed to the International Security Assistance Force's Joint Command in Kabul, Afghanistan, as chief of that force's space operations. Lieutenant Colonel Single's operational experience includes ICBM, space, and air and space operations center weapon systems. He has also served as chief of theater support, Weapons and Tactics Branch, at Headquarters Air Force Space Command. He has participated and won several awards in joint and combined operations and exercises in the US Central Command, US European Command, and US Pacific Command areas of responsibility and has served in an array of space officer capacities. An internationally recognized expert, Lieutenant Colonel Single has served as an invited guest speaker at numerous international events and has authored several articles on NATO and coalition space operations.



Building an Offensive and Decisive PLAAF

A Critical Review of Lt Gen Liu Yazhou's *The Centenary of the Air Force*

Guocheng Jiang

On 1 October 2009, the People's Republic of China celebrated its 60th anniversary with all kinds of modern weaponry parading through and above Tiananmen Square in an unprecedented show of force. Soon after, China's People's Liberation Army Air Force (PLAAF) also turned 60 on 11 November 2009 and launched its own series of celebrations. In a media blitz featuring TV shows, newspapers, and seminars, a number of renowned PLAAF strategists entered the spotlight to talk about the PLAAF's strategic past, present, and future. Among them, Lt Gen Liu Yazhou was recognized by many members of the Chinese audience as the "Douhet of China," probably because of his reputation as a daring forward thinker, a vehement speaker, and a fascinating personality.¹ Italian general Giulio Douhet advocated strategic bombing, but his book *The Command of the Air* proved so controversial that it drew strong criticism from his military colleagues, many of whom interpreted it as a theory of "total war." General Liu, in contrast, has gathered strong support and has profoundly influenced the Chinese airpower community. In this sense, and to a certain degree, to understand General Liu's thoughts is to understand the PLAAF.

The general's writing has established him as China's preeminent airpower theorist. On 10 November 2009, a special edition of the People's Liberation Army (PLA) publication *Military Weekly* included an abbreviated version of his monograph *The Centenary of*

the Air Force (百岁空军), which first appeared in the early 2000s in Chinese and then in 2008 in an English translation, along with Liu's other important articles.² His monograph presents a number of unique views on the PLAAF's effort to transform itself from a mere appendage of the other services into its current status as an independent service—views that afford important insights for those who seek to understand the PLAAF's historical context. General Liu's perspective on Chinese strategic considerations has proven highly influential among elite PLAAF strategists who are helping shape the air force into a strategic force designed to perform independent, offensive, and decisive roles in future wars. This article distills the essence of General Liu's monograph and critically analyzes it in order to provide a Western audience some insight into a highly regarded advocate of Chinese airpower.

Three Revolutions and Three Steps

General Liu divides the development of military affairs into three revolutionary stages. The first revolution occurred in the nineteenth century, when navies ended land armies' traditional dominance of wars. The second revolution took place in World War II when Germany, although possessing tactically superior fighters and attack aircraft, lost to an equally good but strategically oriented British (and Allied) airpower force that developed an exceptional fleet of stra-

tegic bombers. The third revolution, which started in the 1990s and continues today, is particularly important to the world's air forces. As General Liu puts it, "Air battlefields have become the decisive battlefields; victories in the air have become the ultimate victories."³ This assertion, now reverberating throughout most PLAAF capstone documents such as *Military Ideology of the Air Force*, originated during the 1991 Gulf War when the PLAAF watched how the US Air Force conducted Operation Desert Storm.⁴ By the time of the 1999 Kosovo war and 2001 Afghan war, the PLAAF was seriously contemplating its own future. These three wars dramatically and swiftly influenced the PLAAF's mind-set. Following a thorough study of all three, the PLAAF began advocating the attainment of war objectives "through the sole use of air strikes" (p. 18). General Liu regards the three wars as the three steps of the third revolution, perceiving the Gulf War as mainly tactical, the Kosovo war as evolving into a campaign-scale operation that pursued strategic goals, and the Afghan war as broadly strategic.

The general contends that, by weathering the three revolutions, the world's major air forces have progressed from ancillary to decisive players in war. The PLAAF must therefore build its strategic capabilities in order to enter the top tier of air-power nations.

Douhet's Theory

Douhet never exerted significant influence on the PLAAF, long dominated by Soviet military doctrine, until the late 1980s when the revolution in military affairs that swept the world's leading militaries reached China. Once rooted in Chinese soil, Douhet's ideas flourished, just as the former Soviet influence waned.

The second chapter of General Liu's monograph analyzes Douhet's theories, concentrating on the efficiency and effectiveness of strategic bombing. He hails Douhet's tenet "defeat in the air is defeat in

the war" as the golden rule in modern warfare (p. 26). Liu notes that Douhet opposed tasking the air force to support warfare on the ground, proposing instead that airpower fight independent, offensive aerial warfare to "end a war before ground and naval forces come into play" (p. 27). Liu acknowledges that during World War II, the Soviet Red Army contravened Douhet's ideas by winning a number of decisive land victories, but he concludes that the Soviets defeated Germany because the Luftwaffe was forced to fight tactical air battles. In his view, neither side fully appreciated the significance of Douhet's "absolute" command of the air, so both of them stuck to the struggle for "relative" air command, thereby ceding the decisive role to the land campaigns. However, Liu asserts that the 1999 Kosovo war belatedly vindicated Douhet's air war theory.

Like many defenders of Douhet, General Liu avoids commenting on the most controversial aspect of his writing, that is, crushing the will of the people by exposing civilian populations to the terror of destruction—total war. In Western military circles, however, Douhet's ideas about the will of the people have remained controversial for decades. Although Liu repeatedly cites the Kosovo war and Operation Iraqi Freedom as proof of Douhet's theory, some Western analysts point out that although the US-led air forces succeeded in the Kosovo war through a bombing campaign that achieved demoralizing effects on Belgrade's populace, Iraqi Freedom's "shock-and-awe" air campaign partially crushed Saddam Hussein's military but did not make much of an impression on the Iraqis. Observing the ongoing wars in Iraq and Afghanistan, Western analysts argue that instead of destroying the people's will, the US military should win the people's minds.

Clearly, the US military has now adopted this view. For example, US Army general William S. Wallace contends that, "as learned during operations following the 'thunder run' to Baghdad, today's conflict involves a strong human element with op-



erations conducted in and among the people.” In recognition of this fact, Wallace states that “conducting full-spectrum operations—*simultaneous* offensive, defensive, and stability or civil-support operations—is a primary theme of the 2008 manual [Field Manual 3-0, *Operations*]” (emphasis added).⁵ In his introduction to the updated version of Air Force Doctrine Document 2-3, *Irregular Warfare*, Lt Gen Allen Peck, formerly in charge of US Air Force doctrine development, also pointed out that irregular warfare is a full-spectrum war whose focus shifts from defeating the enemy’s military forces to gaining support from the general population.⁶ Both generals’ remarks indicate that modern wars are deviating from conventional patterns; thus, bombing alone can hardly achieve national objectives, total war is not the solution, and victory necessarily depends heavily upon “boots on the ground.”

Nuclear Threshold

General Liu insightfully relates airpower’s development to the concept of a nuclear threshold—the point in a conflict at which nuclear weapons would be used. He believes that the United States first erected the nuclear threshold soon after the Hiroshima and Nagasaki bombings, allowing neither itself nor anyone else to cross over. Again, the United States first transcended this threshold by means of conventional airpower weaponry. Modern air forces, with their speed, range, precision, and mobility, are powerful enough to deter adversaries or bring formidable enemies to terms without threatening the use of nuclear weapons. Characterizing the US air strike against Libya in 1986 as the first battle to transcend the nuclear threshold and “the embryonic model of wars that followed it,” Liu claims that “traces of all the characteristics of the new military era are to be found in this battle” (p. 30).

This viewpoint is widely shared within the PLAAF. For example, according to *Military Ideology of the Air Force*, “In modern local wars, although the risk of employing nu-

clear weapons still exists, the practicality of remote precision strike capabilities of conventional airpower has far exceeded that of nuclear weapons, and as such, the former can fully replace the latter as a primary strategic choice.”⁷ Another prominent PLA analyst, Sr Col Yao Yunzhu, points out that “studying the nuclear thinking of earlier Chinese leaders like Mao Zedong and Deng Xiaoping, we find that neither man considered nuclear weapons usable on the battlefield in the same way as conventional means. Moreover, neither believed that nuclear wars could ever be fought and won in a measured and controlled way.”⁸ Under this guidance, China’s military development in recent years has concentrated on strengthening its conventional strategic—rather than nuclear—deterrence and counterdeterrence capabilities, with air force modernization as a huge priority. Putting these efforts under Liu’s lens, one may see that China is seriously preparing itself to transcend the nuclear threshold “from the skies” (p. 29). Liu believes that as conventional airpower grows more formidable, nuclear deterrence becomes less relevant. Globally, several incidents further support Liu’s argument: Israel’s bombing of Syria’s suspected nuclear factory in 2007, the US missile attack in 1998 on a Sudanese pharmaceutical plant that was allegedly producing nerve gas agents, and Israel’s threat to use preemptive air strikes against Iran’s nuclear facilities.

Great Wall

As an airpower advocate, General Liu perceives China’s Great Wall from a unique perspective. On the one hand, he sees it as a human masterpiece and source of pride in Chinese architectural history. On the other hand, he deems it a humiliation because this line of defense never succeeded in stopping invasions from the north. Liu derides France’s Maginot Line, designed to halt a German assault, as another fiasco similar to the Great Wall. The only differ-

ence is that the Great Wall was overcome by land forces alone, and the Maginot Line by a combination of land and air forces in a three-dimensional battlespace. Liu goes on to interpret Japan's offensive in the Pacific during World War II as one that intended to establish, "in the words of Isoroku Yamamoto, 'an oceanic line of defense against the United States,'" only to suffer a crushing blow from the sky (p. 35). He belittles the Iraqi defense line in the desert during the first Gulf War as the last line of land defense, which proved totally helpless against modern US airpower. Through citing and comparing these historical lines of defense, Liu highlights the significance of "the U.S. armed forces' shattering of Saddam's line of defense," calling it a milestone that "marked the obliteration from warfare of the traditional pattern of defense" in the unfolding airpower era (p. 36).

Three Types of Air Forces

Along this line of reasoning, General Liu contends that physical lines of defense have been rendered obsolete by airpower but that cognitive lines of defense can be penetrated only by cultivating a "perpetual [offensive] spirit" (p. 37). Liu divides modern air forces into three types—defensive, offensive, and both defensive and offensive. He argues that, currently, the PLAAF is the only major power evolving into the third type (defensive and offensive), guided by China's active defense strategy. However, recognizing that the core role of airpower is offense, he "maintain[s] that the heart of simultaneous offense/defense is offense. In other words, offense is the best defense" (p. 38). Liu believes that only an offensively oriented air force matches the great-power status of China. Put differently, in its effort to achieve a strong ascendancy during the twenty-first century, China must build offensive airpower to defend its expanding interests. He assures us that this belief is based not only on understanding the nature

of the air force, but also on comprehending the essence of China as a major power.

Borders of National Interests

General Liu observes that in addition to protecting the national territory, national security has the more important function of protecting the national interests. The borders of a nation's territory are limited, but national interests have no bounds. With this definition in mind, he cautions that China should differentiate between defending its territorial borders and securing the borders of its national interests. The farther out the latter, the more secure the former, and the front line of security should extend wherever a nation's interests go. The United States operates according to this principle, and so should the rising China. Moreover, the United States has actively employed its Air Force wherever US strategic interests lie, so China should do the same by using the PLAAF to enforce its national objectives. Liu quotes the famous declaration of Adm Dennis C. Blair, former commander of US Pacific Command: "We respect the authority of the People's Liberation Army on their mainland, but we must make them understand that the oceans and skies are ours" (p. 44). Liu then reiterates the urgency of accelerating the PLAAF's advancement: "The development of [China's] air power is not something that is dispensable or can be delayed" (p. 50). In another well-known monograph, *The Grand National Strategy*, Liu elaborates in much more detail on how China should reshape the security environment along its periphery.⁹

Aerial Combat

To General Liu, the Vietnam War was a watershed event during which US airpower terminated the era of air-to-air combat. He observes that the last ace pilot was Capt Steve Ritchie of the US Air Force, who shot down five MiGs during the Vietnam War. Modern warfare, he argues, no longer offers



opportunities for pilots to shine as aerial gladiators. Aerial combat has almost disappeared since the advent of global strike capabilities. The advance of science and technology is quickly rendering single-role air-superiority fighter aircraft obsolete. Consistent with this trend, Liu finds that almost all countries have stopped manufacturing fighter planes dedicated to air-to-air combat. Meanwhile, modern fighter-bombers, with all-weather fighting capabilities, are becoming increasingly important. Liu cites the US Air Force as a typical example of a force whose fighter-bombers now comprise the great majority of its fighter fleet. By comparison, China's PLAAF appears to be the exception, having only the H-6 as its strategic bomber and the Q-5 as its attack-type bomber. Noticing the contrast, Liu laments that China "has continued to advance in the direction of aerial combats" (p. 42). Unhappy with the situation, he "maintain[s] that an air force should not merely be a force of fighter planes," echoing Douhet's view that, "even a force of a defensive nature must set up a powerful contingent of bombers" (p. 40).

Some analysts might dispute Liu's assertion that the Vietnam War ended the era of air-to-air combat by readily citing the same Bekaa Valley air battle of 1982 that Liu uses to prove the phaseout of aerial combat. In that battle, the Israeli Air Force, armed with modern Airborne Warning and Control System aircraft, not only destroyed all 19 Syrian surface-to-air missile batteries and their radar sites, but also downed more than 80 intercepting Syrian MiGs through aerial combat.¹⁰ Although most Syrian fighters were shot down before their pilots had a chance to engage Israeli aircraft, the Bekaa Valley battle remains an example of post-Vietnam air-to-air combat.

People's War

Although almost all Chinese defense white papers stress the importance and relevance of "people's war," which Mao Zedong,

founder of the People's Republic of China, successfully theorized and practiced, General Liu argues that people's war is essentially defensive, aimed at trading space for time, and is totally misaligned with the nature of modern war. People's war relies on strategic depth and serves as a black hole that devours enemy military resources. Today's war, however, is offensive and multi-dimensional, always striking from the sky first, defying and transcending traditional notions of strategic depth. To prove this point, Liu cites a scene from the 1999 Kosovo war, in which "we heard an old Serb praying, 'God, if you pity the Serbians, have NATO [the North Atlantic Treaty Organization] come down. . . . [Let's] fight . . . on the ground, . . . win or lose'" (p. 18). From numerous war reports, we now hear about similar remarks made by Taliban fighters hiding in mountain caves. Liu concludes that the main battlefield has moved up to the skies, "and, like it or not, the 'people' can do nothing about [it]" (p. 44).

Liu adopts the somewhat radical position of doubting that Mao's theory of people's war will regain popularity someday. Yet, soon after the initial publication of the general's monograph, the world witnessed the siege of Fallujah in Iraq and the Israeli-Hezbollah war of 2006 in which the "people" mattered a great deal. Besides, in the emerging era of cyber warfare, it is possible that civilians may turn themselves into hackers, launching attacks on everything in the opponent's virtual space. A Chinese author already envisions such a scenario, seeing thousands, if not millions, of "phantom warriors" fighting in this new type of "informationized people's war."¹¹

Manifestation of National Will

General Liu asserts that there are two first-rate military powers in the world—the United States and Israel—and that they share one striking trait: both favor and are adept at the employment of airpower. Alluding to the term "gunboat diplomacy," Liu

describes the United States as conducting aerial diplomacy to bring the whole world under the shadow of its aircraft's wings. The 1983 Grenada invasion, the 1989 seizure of Panama's president Manuel Noriega, the Gulf War of 1991, and the 1999 Kosovo war represent just a few such examples. Liu goes further, referring to the Israeli Air Force as the "guardian angel" of its country's very survival (pp. 45, 46). As an airpower strategist, Liu agrees that Israel must maximize the precision, speed, range, and lethality of its airpower to preclude protracted wars it cannot afford, citing Israel's 1982 Bekaa Valley aerial battle, the 1976 airport rescue in Entebbe, Uganda, and the 1981 bombing of Iraq's Osirak reactor as classic cases of airpower enforcing national will.

Liu observes that whenever incidents occur somewhere around the world, the first reaction of the United States is to send aircraft. Additionally, because air forces possess "the greatest fighting strength in times of war," Liu considers airpower "the most powerful deterrent at all other times and . . . therefore the best tool for enforcing the national will" (p. 46). He concludes that air strikes not only fulfill military effects but also achieve national objectives—and that airpower is used not merely to show military might but to demonstrate national resolve.

Electronic Warfare

Although the Bekaa Valley battle was widely considered a sign of a new wave of technical revolution sweeping through the airpower arena, it initially did not seem to alarm the PLAAF deeply. However, after observing unexplained, abnormal phenomena in the sky along China's southeastern seaboard in 1994, the Chinese military suspected that the United States had started electronic warfare against China. General Liu claims that, unbeknownst to China, US stealth bombers also may have entered Chinese airspace. "The revolution has come!" cries the general (p. 52).

Like many Chinese military strategists, Liu does not clearly differentiate between electronic operations taking place primarily in the electromagnetic spectrum and information operations occurring mainly in cyberspace. The characteristically Chinese word "informationization," which covers both domains, has remained popular in Chinese military circles. Watching this informationization of warfare taking shape, in which airpower plays a major role, Liu asserts that this ongoing technology revolution occurs in three stages. First is transformation from ground-based command to airborne command and then to integrated command enabled by airborne early warning systems. Next, remotely piloted aircraft conduct attack and bombing missions. The third stage, yet to come, will feature Web confrontation and cyber warfare. Liu believes that the decisive factor is the systematization of different electronic technologies into a distributive, yet coherent, network. This view is shared by PLA leadership. Observers see that many recent major joint exercises among PLA garrisons have focused on combat training encompassing networked system confrontations in both the electromagnetic spectrum and cyberspace. Witnessing cyber capability evolving into a crucial enabler, Liu boldly forecasts that as sophisticated conventional airpower capabilities powered by advanced information technology gradually render nuclear deterrence irrelevant, major powers with information superiority may create an "information 'umbrella'" to replace the nuclear umbrella (p. 53). This prophecy may bewilder analysts who view the nuclear umbrella provided by the United States to its European and Asian allies primarily as a means of discouraging these countries from developing and maintaining their own nuclear arsenals, and secondarily as part of extended deterrence. Therefore, if Liu's prophecy is to come true, nuclear nonproliferation efforts must have first reached a point close to President Obama's vision of a "world without nuclear weapons."¹² The United States is making serious efforts to establish



“‘new, tailored, regional deterrence architectures’ which will ‘make possible a reduced role for nuclear weapons in our national security strategy.’”¹³ Meanwhile, information sharing between the United States and its allies is indeed becoming more critical for national and global security. But how and when such information sharing evolves into an umbrella functioning like the current nuclear umbrella remain to be seen.

High Frontiers

General Liu points out that American history has featured constantly changing frontiers, both horizontally and vertically. After the 50th state joined the union, the United States continued to extend its external frontiers as leader of the Western alliance. Now the United States has again taken the lead in extending the high frontier. The twentieth century saw the theory of sea power followed by that of airpower. In the twenty-first century, Liu anticipates that the theory and practice of space power will surely prevail. Echoing James Oberg’s book *Space Power Theory*, Liu holds that whoever dominates space will dominate the world. Furthermore, by comparing the evolution of aircraft with that of spacecraft, Liu predicts that loading kinetic and nonkinetic weapons onto space platforms is a logical line of thinking, “just as machine guns and aerial cannon were fitted onto aircraft at the outset of World War I” (p. 56). He summarizes his points by saying that “space is warfare’s ultimate vantage point . . . the ultimate opportunity for all countries and all armed forces” (p. 56).

War against China and War against Taiwan

General Liu posits that the United States does not want to stop China from developing; it only wants China to develop within the limits that America sets. War is a possibility if China oversteps the red line estab-

lished by the United States, who, for example, is already weary of watching China grabbing resources all over the world. Recognizing that most wars are fought for resources, Liu bluntly points out that the United States “uses Taiwan to seal off our access to markets” and “intercepts our petroleum by means of the war in Afghanistan” (p. 49). What might happen if war erupted between these two countries? General Liu predicts that such a war would definitely be aerial: “The enemy will not send a single soldier onto Chinese soil. Air strikes will decide our country’s fate and survival” (p. 23). Further, he expects this war would erase the distinction between either front lines and rear areas or forward resistance and in-depth defense; be omnidirectional, with strikes coming from or beyond the horizon; be brief but with very heavy casualties; and be shrouded in an all-encompassing information network.

Similarly, Liu envisages a war against Taiwan as one fought in the sky. In view of Taiwan’s strong airpower buildup, he suggests that the PLAAF should “(a) bear the brunt of the operation; (b) be prepared to play the leading role in the war; and (c) be able to conduct a frontal and independent war, or what we often refer to as ‘going it all the way’” (p. 25). The general asserts that “we will have Taiwan if we have the skies” (p. 24).

When scrutinizing General Liu’s thinking on a potential war against Taiwan, we should also take note of another of his in-depth monographs, *The Issue of Taiwan and Taiwan Independence*, in which he characterizes a potential war across the Taiwan Strait as a “civil war.”¹⁴ If this is the case, one may question whether Liu still insists on launching air strikes that would be inherently deadly, inflict widespread destruction, and risk civilian lives. To be sure, though, General Liu assumes that modern air strikes are surgical in nature, and he is vehemently “against rushing into armed conflict with Taiwan, especially armed conflict that causes indiscriminate destruction.”¹⁵

Supporting Role versus Supported Role

A strong advocate of independent air forces fighting independent wars, General Liu appears less concerned with airpower's supporting roles. Commenting on the Afghan war, he contends that "small units of ground forces" are dispatched "merely in the service of the air force's precision strikes" (p. 19). Readers might interpret this observation as reducing the ground force's role to that of an embedded forward air controller. However, they should bear in mind that Liu's monograph was published at a time when the proper balance between airpower's supported and supporting roles was a matter of debate within the US Air Force, which has since adapted its doctrine to the battlefields in both Iraq and Afghanistan. Emphasis has shifted from air strikes to foreign internal defense, combat support, stability operations, and learning about the regional culture. Though the PLAAF watches and follows its US counterpart closely, similar discussions about supporting versus supported roles rarely appear in published PLAAF sources.

Also notable is the reaction, or lack thereof, from the PLAAF to the war between Israel and Hezbollah in 2006. This war drew broad attention within military circles worldwide and prompted some airpower advocates to wonder whether the 1999 Kosovo war, conducted solely from the air, had become either the norm for future wars or an exception. In contrast, General Liu, as well as many other PLAAF strategists, continues to stress the importance of airpower's playing independent and decisive roles in future wars.

Russian versus American Armed Forces

As with a number of articles and books written by leading PLAAF strategists, throughout his monograph Liu disdains Soviet (Russian) force structure and admires

US armed forces. The Soviet Red Army, having served as a role model and supporter of the PLA ever since the latter's formation, now finds itself the object of its Chinese "student's" disapproval. The current generation of PLAAF leaders, who watched every detail of the Gulf War in awe, pondered why the Americans were able to launch such spectacular air campaigns. General Liu condenses his answer to three elements: adopting forward-thinking military strategy, emancipating the mind, and employing science and technology.

Favorable references to the US military are abundant in *The Centenary of the Air Force*. Take, for example, Liu's comment "As well as being our army's opponent, the U.S. Army is our army's teacher" (p. 20). He goes on to say that "the United States has always chosen its enemies on the basis of the other countries' strengths rather than their intentions. China will qualify for being a friend of the United States only if it becomes an adversary the United States cannot defeat" (p. 50), and that "our opponent is too strong, yet I have always believed that living in the same times as today's U.S. armed forces is the Chinese armed forces' good fortune rather than their misfortune. We need the kind of great thinking exercised by the U.S. armed forces" (p. 57). Liu does not hide his deep respect for the US military, noting that "the U.S. armed forces, though the most powerful, are the most crisis-conscious" (p. 22). He expresses this esteem philosophically, saying that "people under umbrellas always fall behind those who run in the rain" (p. 33)—implying that those countries strolling idly under umbrellas will never catch up with the "crisis-conscious" Americans, who forever run as if they were in heavy rain.

Cost of War

Admiration is one thing, following suit is quite another. General Liu, while applauding the way the US Air Force launches offensive attacks, talks very little about the

cost of wars that no one other than the US Air Force could afford to wage. He claims that air strikes are “a sort of highly cost-effective type of warfare for replacing expensive ground warfare” (p. 45). But analysts see that even a country as rich as the United States finds itself bogged down in the lavish way it fights its current wars. The US Air Force is desperately searching for ways to reduce sorties, save fuel, and create new and more cost-effective war-fighting techniques. With China rising economically and militarily but at the same time burdened by so many bureaucratic, financial, and technical obstacles, it remains to be seen whether the PLAAF will be able to balance its aspiration to fight in the US style with its actual ability to fight within its own ways and means.

Conclusion

The Centenary of the Air Force presents only General Liu's personal views—not the official doctrine of the PLAAF. However,

considering his prominent status as a senior PLAAF officer who recently became the political commissar at PLA National Defense University, and considering the timing of the republication of his monograph, there is strong reason to believe that, to a large degree, his views represent mainstream PLAAF thought. In his new position, Liu may readily extend his ideological influence to the other services through the university forum.

China is continuing its active defense policy and constantly rebalancing the defensive and offensive elements of the policy equation. The world is witness to China's gradual expansion of its defense periphery. All through this process, the PLAAF is playing a critical role on the offensive side of the equation, and great strategic minds, such as Liu's, are helping spearhead the process. In the years ahead, General Liu's calls to accelerate the building of China's strategic airpower to defend its expanding periphery will likely become more dominant in PLA military affairs. ✪

Notes

1. A search for “刘亚洲” (the Chinese name for Liu Yazhou) in either Google or Baidu yields numerous recent articles and blogs that crown Liu “Douhet of China.”

2. *Chinese Law and Government*, a bimonthly journal, published two booklets by General Liu: *The Dilemmas and Prospects of China's Military Modernization and Air Power Strategy* (January–February 2008), and *The Voice of a Fifth Generation Leader* (March–April 2007).

3. Liu Yazhou, “The Centenary of the Air Force,” *Chinese Law and Government* 41, no. 1 (January–February 2008): 17. Hereafter, page references to this article are cited parenthetically in the text.

4. Min Zengfu et al., *Military Ideology of the Air Force* (空军军事思想概论) (Beijing: PLA Publishing House, 2006), 394.

5. Gen William S. Wallace, “FM 3-0, *Operations: The Army's Blueprint*,” *Military Review* 88, no. 2 (March–April 2008): 3, 4, http://usacac.army.mil/CAC2/MilitaryReview/Archives/English/MilitaryReview_20080430_art004.pdf.

6. Lt Gen Allen G. Peck, “Doctrine Update: AFDD 2-3, *Irregular Warfare*,” *Air and Space Power Journal-Chinese* 2, no. 3 (Fall 2008): 55.

7. Min Zengfu et al., *Military Ideology of the Air Force*, 232.

8. Sr Col Yao Yunzhu, “China's Perspective on Nuclear Deterrence,” *Air and Space Power Journal* 24, no. 1 (Spring 2010): 28.

9. Liu Yazhou, “The Grand National Strategy,” *Chinese Law and Government* 40, no. 2 (March–April 2007): 13–36.

10. C1C Matthew M. Hurley, “The Bekaa Valley Air Battle, June 1982: Lessons Mislabeled?” *Airpower Journal* 3, no. 4 (Winter 1989): 60–70, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj89/win89/hurley.html>.

11. Luo Chyn-Bor, “The Chinese People's War: Theory, Application, and Its Significance in Modern Warfare,” *Air and Space Power Journal-Chinese* 3, no. 3 (Fall 2009): 85.

12. Barack Obama, “Remarks by President Barack Obama,” Office of the Press Secretary, The

White House, 5 April 2009, http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered.

13. Kingston Reif and Chad O'Carroll, "Fact Sheet: 2010 Nuclear Posture Review," Center for Arms Control and Non-Proliferation, 2010, <http://>

www.armscontrolcenter.org/policy/nuclearweapons/articles/fact_sheet_2010_nuclear_posture_review.

14. Liu Yazhou, "The Issue of Taiwan and Taiwan Independence," *Chinese Law and Government* 40, no. 2 (March–April 2007): 56.

15. *Ibid.*, 60.



Mr. Guocheng Jiang

Mr. Jiang (undergraduate diploma, Shanghai Institute of Foreign Languages, China; MA, Nanjing Normal University, China; MA, Johns Hopkins University, USA) is the editor of *Air and Space Power Journal-Chinese*. Prior to joining the *Journal*, Mr. Jiang worked a number of years in US publication and software industries as a language specialist and project manager. His earlier experience in China includes reporting, interpreting, teaching, and editing. He is the author of *Gate to GATT* (1993) and cotranslator of *Dragon Fire* (two volumes, 1995). Mr. Jiang has also written several articles about the changing Chinese culture.

Your Air & Space Power Publisher

Currently seeking manuscripts on Air & Space Doctrine, Strategy, History, and Biographies of Pioneer Airmen



AUPRESS

AIR UNIVERSITY PRESS

155 N. Twining Street

Maxwell AFB AL 36112-6026

For catalog or information, call

334-953-2773/6136 DSN 493-2773/6136

Fax 334-953-6862 Fax DSN 493-6862

<http://aupress.au.af.mil>



Wired for War: The Robotics Revolution and Conflict in the 21st Century by P. W. Singer. Penguin Press (<http://us.penguin.com>), 375 Hudson Street, New York, New York 10014-3657, 2009, 400 pages, \$29.95 (hardcover), ISBN 1594201986.

Editor's Note: This book appears on the 2010 Air Force Chief of Staff's Reading List.

Wired for War is a world away from P. W. Singer's previous book *Children at War*, in which he proposed ways to halt such a horrible practice. This latest venture, a study of the use of robotics in combat, could be taken as futuristic, with Singer enticing his readers to be swept up by the excitement of using advanced technology on and over the battlefield—or on and under water. The author points out early on that many robot systems are already working the battlefields of today's conflicts. Filling a market need, they appear in ever-growing numbers that could equal those operating in domestic service and industry.

It would be wrong to say that this is a book purely for the military reader although this audience will benefit from the knowledge contained within its pages. The text is written for a broader readership, raising many important moral and ethical conundrums that need to be addressed and solved. For younger servicemen and -women, who as children played with Transformers, this book amplifies what they already know—that robotic platforms will play an increasingly important part in future military operations. More senior military readers may well learn that a new facet of war is already fast approaching, removing preconceived ideas of how Soldiers should close with and kill the enemy.

My only criticism concerns Singer's propensity to concentrate on just a few commercial

members of the military-robotics community. Those experienced in this field understand that no robot can complete all of the required missions. We currently have in service many different robotic platforms, made by a range of producers, that perform unsung, important duties each and every day. To be fair, Singer correctly states that his named robotic platforms have already kept servicemen out of harm's way and have undoubtedly saved many lives.

Unlike Isaac Asimov, whose rules for robots prevented them from causing harm to humans, Singer confirms that real robotic platforms of the near future have a vast array of missions, many of which can inflict great damage upon an adversary. Singer points out that changing who fights at the fundamental level "transforms the very agent of war" (p. 194). No one can deny that post-human warfare is an intriguing thought. The psychology of war may also change, and Singer examines the effect of losing moral considerations, when robotic warriors in contact with the enemy and their distanced operators no longer experience fear, shock, or anger (p. 262). Without these moral inputs, how do we halt an advance? Or how do entrenched forces conclude that to fight on is beyond reckless? How, indeed, can we win battles?

Singer broadens his discussion a few pages further on (p. 268). If technology aids overconfidence and if nations have gone to war because of overconfidence, then unmanned warfare could become a favored, regular option for those intent on conflict. We could see an increase in the number of tactical engagements between technologically capable nations. Terrorist organizations could also buy and use their own robotic machines, and any military planner will have to factor in such use against our forces in the future.

Singer describes a range of robot capabilities, from those totally controlled by an operator to preprogrammed systems that operate by means of artificial intelligence. What are the moral implications when technologically advanced nations use such systems to fight the enemy? A "sense of mutuality" (p. 365) helps commanders consider moral issues. As man and machine become more separated by distance and as robot systems are programmed to function autonomously, a danger exists that associated moral considerations will not get the attention they need. Singer alludes to this (p. 366) but does not really develop his argument any further although it merits greater discussion. If we can accept the notion that robot versus man is on

course to happen, then we should be ready to debate the implications of such confrontations in order to probe and understand the associated moral implications.

When machines kill, what is the supporting legality behind such actions? Singer tackles this aspect well (chap. 22), exposing the need for lawyers to become an increasingly integral part of military operations (p. 327). The presence of lawyers in forward operating locations is now a fact of life in current operations. Increasing the use of remotely piloted lethal platforms may well demand space for lawyers alongside the distanced cubicle warriors.

As the supporting technology of robotics expands and we make increasing use of artificial intelligence, the conflicting ethics of using these platforms needs critical deliberation and assessment. Maybe we need to program robotic systems with rules of engagement that reflect the Law of Armed Conflict. Perhaps, Singer muses, we need to introduce a "human impact statement" (p. 361) that addresses this new class of "killing machine," with its associated ethics and potential for social infringements.

Wired for War is not just about the effect of using robots in conflict. It paints a far broader canvas of how technology will cause us to question and ultimately change our operating procedures. The book highlights the need to understand the moral and ethical implications of using such weapons. Given that the use of robotic systems is already upon us, Singer raises a myriad of associated concerns that military, political, and legal minds need to address.

Wing Cdr John M. Shackell, RAF, Retired
San Antonio, Texas

The International Politics of Space by Michael Sheehan. Routledge (<http://www.routledge.com>), 270 Madison Avenue, New York, New York 10016, 2007, 248 pages, \$170.00 (hardcover), ISBN 978-0-414-39807-7; \$43.95 (softcover), ISBN 978-0-415-39917-3.

Distant heavens have captured human imagination for millennia, but not until just over 50 years ago were man-made objects—and, later, men and women—sent into space. Since then, the world has become increasingly dependent on space power for everyday utilities, management of global commerce, and national security af-

fairs, as well as domestic stability and prosperity. But humankind's ability to venture into space created a complex dilemma for its "proper" use. Optimists view space as a global commons that should be free from human divisiveness and accessible by all. Pessimists—and perhaps pragmatists—on the other hand, predict that space eventually will be prone to weaponization, conflict, and other sorts of misuse, as were land, sea, and air previously. These competing views set the stage for critical analysis on the topic. The differing perspectives also point out that space is inextricably tied to politics in the rising tide of globalization in the twenty-first century.

The International Politics of Space provides readers an authoritative departure from previous analysts' treatments of the subject by examining historical developments of national space programs through international relations and national security lenses in order to glean lessons applicable to the continued maturation of the space age. This analysis includes space policy, doctrine, and technology as they relate to fundamental political motives. Sheehan's conclusions are pertinent to today's complex international structure because there are direct and indirect political outcomes from space programs and their underlying policies that influence national behavior in the ever-changing global balance of power. Political and military leaders of the future will face many challenges vis-à-vis space, and informed consideration of previous space policies may help shape their decisions.

The book begins with a brief survey of major political theories and then analyzes their relationship to space policies during the space race between the United States and Soviet Union and beyond. Sheehan's work also includes chapters on the European Space Agency, India, China, the military use of space and its supporting doctrine, space treaties and laws, and cooperative efforts among various nations.

Readers will find well-researched analysis with supporting evidence illuminating the many political motives for national and international space policies of the past. The most important of these include political equities in the form of national prestige and propaganda, development of indigenous science and technology, political independence from friendly and rival space-faring nations, and even rationale supporting the merits of each superpower's foundational political philosophy.

Sheehan concludes that the public space policies of many nations are not necessarily the true

underlying reason for pursuing a space program. Perhaps the most noble of stated intentions—"to benefit mankind through exploration"—gets short shrift in favor of purely realist pursuits to enhance one's own internal and external national security at the expense of one's rivals. For instance, the USSR's strategy sought to achieve a list of "firsts" in order to quell public commentary in the West about the inferiority of the Soviet technology base. Indeed, the Soviets had some impressive firsts, including the first satellite, first mammal, first person, first woman, and first extravehicular activity in space. Crucially, Nikita Khrushchev used these achievements to gain political clout by extrapolating them as proof of communism's ideological triumph over capitalism and democracy. He did so for both internal and external audiences in order to consolidate Soviet power within the union and around the world. On the other hand, the United States was surprised and motivated out of fear after the launch of *Sputnik I* in 1957. The near hysteria that followed made the United States reassess its initial conclusions about the state of the USSR's science-and-technology infrastructure and capabilities.

Another major theme woven through the book is the natural tension associated with the development of booster and spacecraft technology. Obviously, these capabilities have natural military utility, but acquiring them can run aground politically when confronted with the internationally recognized and promulgated concept of the space sanctuary. From a political perspective, crossing—or even approaching—the indeterminate threshold between militarizing space and weaponizing space can cause political angst and public outcry. Sheehan's exploration of this scenario provides valuable insight as perceived through his look at the European Space Agency.

The bibliography and endnotes contain all the major authoritative works on this topic such as James Oberg, Bruce DeBlois, Everett Dolman, and Walter McDougall, as well as historically important treaties, laws, and doctrine publications. The result of such comprehensive research is reflected in the depth of analysis, which is unlike any other as it pertains to politics.

Disappointingly, Sheehan somewhat glosses over powerful economic motivations for and against space programs as they relate to power politics, both global and domestic. Tangible lessons are available, and this area needs further revelation.

The International Politics of Space achieves its stated goal of avoiding analysis of military uses of space and its subset—weaponization of space—in favor of considering the larger political significance of the major national space programs around the world. By doing so, this volume contributes significantly to the body of knowledge associated with the development of space policy. Although this is not the final episode in the refinement of space policy, students and practitioners alike will benefit from Professor Sheehan's work as the space era moves into its sixth decade. Undoubtedly, his comprehensive work will fuel additional and needed analysis of space policy and its impact on global politics.

Lt Col Kevin M. Rhoades, USAF

*Supreme Headquarters Allied Powers Europe
Casteau, Belgium*

Killing Pablo: The Hunt for the World's

Greatest Outlaw by Mark Bowden. Atlantic Monthly Press/Grove Atlantic (<http://www.groveatlantic.com>), 841 Broadway, New York, New York 10003, 2001, 296 pages, \$20.00 (hardcover), ISBN 0871137836.

Mark Bowden, author of *Black Hawk Down*, has written a gripping account of the rise and fall of Pablo Escobar, the notorious Colombian drug baron whose ruthless "silver or lead" policy placed him above the law. Escobar systematically corrupted government officials by forcing them either to accept his money (silver) or his bullets (lead). His control of cocaine profits financed this corruption as well as his lavish lifestyle. Building public housing and soccer fields for the poor in his hometown of Medellín made him a local folk hero, but his crimes progressively tarnished his public image. In a possible allusion to Tom Clancy's classic book of 1989, Bowden refers to Escobar as "a clear and present danger" (p. 59).

More than an exciting crime story, *Killing Pablo* probes the dark nexus among terrorists, organized criminals, and democratic governments. Colombian drug cartels initially helped their government fight guerrillas, but a symbiotic relationship later evolved between the cartels and guerrillas. To fight the cartels, the Colombian government blended traditional law enforcement with a desperate strategy of fighting terror with terror. The government initially attempted

law enforcement, but Escobar's "imprisonment" from 1991 to 1992 proved a humiliating farce because he controlled the prison. His escape led to a massive manhunt based on an altered government strategy. Bowden contends that the Colombian and US governments' new strategy was simply to kill Escobar while officially claiming they merely wanted to capture him.

Bowden characterizes the manhunt as a targeted assassination, a troubling notion for two democratic governments ostensibly dedicated to the rule of law. The Colombian government was unable to stop Escobar due to feckless politicians and corrupt, incompetent police and military officials. The US government, eager to stifle the flow of cocaine, was plagued with intense inter-agency competition to gain bureaucratic advantage by catching the outlaw. US officials may also have exploited a change in US presidential administrations to get away with dubious covert operations before incoming Clinton administration officials fully understood what was happening (p. 195). The United States secretly sent military operatives and advanced electronic-surveillance gear while the Colombians formed a special police unit called the "Search Block" to track down Escobar. The Search Block soon acquired a reputation for killing suspects rather than arresting them. Even worse, the author claims that both governments condoned a shadowy vigilante group called "Los Pepes" (a Spanish acronym for "People Persecuted by Pablo Escobar") that included criminals. The Search Block allegedly funneled intelligence information from the United States to Los Pepes members, who methodically murdered many people thought to be associated with Escobar, decimating his henchmen. Bowden thinks that US officials knew what Los Pepes was doing but concludes that "there would always be powerful, well-intentioned men who believed that protecting civilization sometimes required forays into lawlessness" (p. 178).

Cyber operations were vital to the manhunt but difficult to perform. Escobar shuttled constantly between hideouts, so the Search Block used US equipment to home in on his cell phone when he called his son. Escobar knew that the authorities were eavesdropping, but "the game wasn't to avoid being overheard—that was impossible—but to avoid being targeted" (p. 237). To ensure that he kept making phone calls, the Colombian and US governments used Escobar's wife and children as bait, refusing to let them flee Colombia out of concern that if Escobar's family fled to safety, he might either surrender

for another farcical prison term or simply vanish. After an agonizing series of failed raids, including an abortive air strike on Escobar's electronically determined location, the Search Block finally zeroed in on his cell phone and killed him.

Today's readers might see parallels between this story and the war on terror. Colombia is not the only country that faces an unholy alliance between terrorists and organized criminals. The evolving partnership between Colombian guerrillas and drug traffickers is reminiscent of that now seen in Afghanistan, where members of the Taliban once fought opium growers but now partner with them to finance their insurgency. Efforts to fight such enemies engender dilemmas for the United States. Bowden explains that "killing Pablo would not end cocaine exports to the United States or even slow them down—everybody knew that—but the Americans had signed on for this job believing that it was about something bigger. It was about democracy, the rule of law, standing up for justice and civilization" (pp. 260–61). Similarly, killing a notorious terrorist may or may not affect the incidence of terrorism, but Americans still fight for the principles that Bowden lists. The questionable government methods used in Colombia may be analogous to our policies for detaining terrorists at Guantánamo Bay and the Central Intelligence Agency's interrogation techniques. Joe Toft, chief of the US Drug Enforcement Administration's Bogotá station, reportedly believed he had struck a Faustian bargain and "felt that to get Pablo they had sold their souls" (p. 268). Hopefully we will not feel that way after the war on terror.

Killing Pablo is based on extensive research—including interviews and official documents summarized in a "Sources" section—that lends credence to the author's provocative assertions. Overall, the book tells an excellent story but raises worrisome questions that we will continue to confront for years to come.

Lt Col Paul D. Berg, USAF
Maxwell AFB, Alabama

The War: An Intimate History, 1941–1945 by Geoffrey C. Ward and Ken Burns. Alfred A. Knopf (<http://www.randomhouse.com/knopf/home.pperl>), 1745 Broadway, New York, New York 10019, 2007, 452 pages, \$50.00 (hardcover), ISBN 0307262839.

Geoffrey Ward and Ken Burns's book *The War: An Intimate History, 1941-1945* accompanies the Public Broadcasting Service's very highly acclaimed 15-hour documentary series of the same name. The project of two award-winning authors who have also made their mark as a historian and a film producer, it captures America's experience in World War II by focusing on the personal reflections of close to 50 residents of four towns (Luverne, Minnesota; Sacramento, California; Waterbury, Connecticut; and Mobile, Alabama), using them to represent all Americans who fought in the war. These individuals include Soldiers, Sailors, Airmen, Marines, factory workers, Nisei (first-generation Japanese-Americans), Afro-Americans, women, and children.

Arranged chronologically, the book begins on Sunday morning, 7 December 1941, with the attack on Pearl Harbor and concludes in August 1945 with the end of World War II and the return of American military forces. By including poignant letters and quotations from servicemen and their loved ones, Ward and Burns reveal the raw emotions of the time and create a clear image of American life during the war. Rather than glorifying the war, the book paints a picture not only of personal determination but also of confusion and horrid carnage.

Several themes appear and reappear throughout *The War*: the home front's determination to support the war and follow events via newsreel, radio, and newspaper; American servicemen's overarching call to duty; and the cruel brutality of the war. A corollary of the latter theme is the desire of American servicemen to protect their families from the horrors they experienced and witnessed. Additionally, many of the book's interviewees discuss how they came to grips with killing and how their experiences profoundly changed them.

Although the authors include a solid overview of the conduct of the war and its battles, as well as a theaterwide perspective, the primary focus or strength of the book remains the numerous personal aspects, mentioned above. Other studies do a good job of conveying the experiences and emotions of either the servicemen or the home front, but Ward and Burns excel in combining the two. Also impressive are the 394 illustrations/photographs and 21 maps, most of which I had never seen before. Picture-researcher David McMahon's high-quality photographs, along with their insightful captions, complement the points under discussion.

I must point out, however, that the authors give only sparse coverage to the air war, particularly in the Pacific theater. Since they concentrate on veterans from four towns, this lack of coverage could be related to availability of the dwindling number of such veterans.

Viewers of the television documentary will enjoy the book as a wonderful companion to the series, and readers who have never seen the documentary will enjoy the book and want to watch the televised version. *The War* is a must-read for readers who wish to learn more about average Americans' (i.e., their parents' and grandparents') personal triumphs, tragedies, and World War II experiences.

Lt Col Daniel J. Simonsen, USAF
Louisiana Tech University

The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War by Sharon Ghamari-Tabrizi. Harvard University Press (<http://www.hup.harvard.edu>), 79 Garden Street, Cambridge, Massachusetts 02138, 2005, 432 pages, \$26.95 (hardcover), ISBN 0674017145.

In *The Worlds of Herman Kahn*, author Sharon Ghamari-Tabrizi uses the life of Herman Kahn (1922-83) to address the effect that the potential use of nuclear weapons in a future war had upon American culture from the end of World War II through the early 1960s. More than just a biography of Kahn, the book examines a wide swath of defense and social issues that faced America during the 1950s and early 1960s, when many people considered Kahn one of the preeminent military (nuclear) strategists. Moreover, it has value for the general Air Force history buff since these early nuclear weapons were initially assigned to the Air Force to manage and possibly employ. Additionally, this study would prove valuable to individuals interested in various issues that America had to confront because of the infusion of nuclear weapons into its military arsenal.

A physicist by education and a storyteller by vocation, Kahn began his professional career at the RAND Corporation, where he utilized the calculations of early game theory to craft military strategy and think about the unthinkable, namely, nuclear warfare. He later founded his own research organization, the Hudson Institute (p. 19). Through these studies and subsequent

lectures, he became a recognized, leading expert on the implications of nuclear war. Kahn published several works (e.g., *On Thermonuclear War* [Princeton University Press, 1960] and *Thinking about the Unthinkable* [Horizon Press, 1962]) that furthered his reputation as a nuclear-war theorist and made him a lecturer in high demand. As Ghamari-Tabrizi describes in some detail, Kahn's glibness enlivened his lectures even though they sometimes had the unintended consequence of alienating him from his audience and marking him as something of a monster for even considering the rationality of nuclear war. Furthermore, during formal briefings, he occasionally offended Air Force audiences with a casual or flippant remark at their service's expense.

Given the notoriety of his published books and lectures, it is no wonder that he is thought to have inspired the character of Dr. Strangelove, who appears in the 1964 movie of the same name, directed by Stanley Kubrick. Indeed, Kahn spoke of a "doomsday machine" (p. 211) as a deterrent during the Cold War, and Strangelove discussed just such a weapon, triggered by an accidental nuclear strike at the end of the movie.

The Worlds of Herman Kahn gives readers interested in the Cold War added perspective by addressing the development and testing of the atomic and hydrogen bombs as well as the growth and role of Strategic Air Command. It also covers the ensuing debate concerning procurement of intercontinental ballistic missiles versus the need for intercontinental bombers (B-52s) as the primary means of delivering nuclear weapons. This author speaks to other issues of that day as well—the concept of and debate over civil preparedness, the employment of the Ground Observer Corps (whose volunteers watched the skies for incoming Soviet bombers), and the use of systems analysts as a means of evaluating the possible use of nuclear weapons during World War III scenarios.

A worthwhile read, *The Worlds of Herman Kahn* offers insights not only into the life of one man and the role he played in crafting our nation's nuclear-weapon strategy during the 1950s and 1960s, but also into American public reactions during the early Cold War years. Mr. Kahn played a significant role in shaping those reactions as he lectured both civilian and military audiences on the implications of the employment of nuclear weapons during a future war.

Col Joe McCue, USAF, Retired
Springfield, Virginia

The Development of Propulsion Technology for U.S. Space-Launch Vehicles, 1926–1991 by J. D. Hunley. Texas A&M University Press Consortium (<http://www.tamu.edu/upress>), John H. Lindsey Building, Lewis Street, 4354 TAMU, College Station, Texas 77843-4354, 2007, 388 pages, \$65.00 (hard-cover), ISBN 1585445886.

"Actually, it is rocket science!" Almost every space engineer has owned, at some point, a T-shirt with that slogan adorned with a field of equations, a rocket, or some other space motif. However, it never did seem quite . . . right. Why? In his excellent book, 25-year-veteran air and space historian J. D. Hunley argues that it's wrong because there is no such thing as rocket science. At least not "rocket science as a body of knowledge complete and mature enough to allow accurate predictions of problems" (p. 289). Hunley spends this volume arguing that the development of American launch vehicles has been a process of engineering and not science, as well as cataloging that development from the first tenuous experiments by Robert Goddard through the evolution of the space shuttle. His effort is the most comprehensive general history of the growth of American rocketry we're likely to see.

Hunley's book is predominantly a managerial history of the various rocket-development programs, both military and civilian. Although he does not delve into equations, Hunley doesn't shy from explaining technical issues and how they were conquered. He provides general chapters on the refinement of ballistic missiles and launch vehicles, and then focuses later chapters on specific systems. Thankfully, Hunley minimizes the politics involved (normally the bread and butter of space histories) and concentrates exclusively on the managers and engineers—those who built the rockets and got them to work. Because of this decision, Hunley's book is very valuable to those who currently work in rocket development because it allows them to understand the past and perform more effectively in the future.

Hunley credits the success of America's launch vehicles to a number of items. Foremost, he lauds the "heterogeneous engineers" (more properly termed, perhaps, "technical managers"): men like Gen Bernard Schriever, Wernher von Braun, and other early leaders who not only understood the complex engineering problems associated with rocket advancement, but also could communicate among many different disci-

plines and express the importance of space-launch vehicles to the general public. Without these leaders, the funding so desperately needed to establish a robust and effective space-launch capability might never have been available. Hunley also describes the unique balance of interservice rivalry and information sharing in the early days of the Cold War that maximized the efficiency of American development efforts. Parallel work by the Army, Navy, and Air Force drove competition that dramatically improved overall growth. At the same time, organizations like the Rocket Propellant Information Agency became vast clearinghouses open to all, limiting overlap in expensive research. Ironically, competition and collaboration were both hallmarks of the most successful development efforts.

Finally, throughout the book, Hunley emphasizes that rockets were made to work—not on the chalkboard with elegant equations but in the workshop with the bending of metal. Rocket scientists could not always predict the problems that accompanied the building of a successful launch vehicle; indeed, more times than they might wish to admit, engineers were forced to “fix” problems by trial and error. Often, without understanding why it worked, they would stumble upon a configuration that solved a problem (in an injector, combustion chamber, etc.) that was causing a rocket to fail or that was causing the original problem. Perhaps worrisome to some, this fact is nevertheless a testament to the “steely-eyed missile men” who built the US space program.

What can the Air Force leader learn from this book? That great managers can help great technicians flourish and do the impossible, and that both are imperative to success. That jealous competition between allies can spur competition, but that we shouldn’t keep secrets because we are all on the same team in the end. That not every problem can be solved on a computer, and that we skimp on the flight-test program at our peril. And most important, especially in the rocket business, that *doing* is often the only way in which *knowing* can happen.

The Development of Propulsion Technology made me proud to be an engineer, but . . . in the end . . . I still like my shirt.

Capt Brent D. Ziarnick, USAFR
Spaceport America, New Mexico

Governing the American Lake: The US Defense and Administration of the Pacific, 1945–1947 by Hal M. Friedman. Michigan State University Press (<http://www.msupress.msu.edu>), Suite 25, Manly Miles Building, 1405 South Harrison Road, East Lansing, Michigan 48823-5245, 2007, 320 pages, \$64.95 (hardcover), ISBN 0870137948.

The title of this book is provocative but misleading, offering a come-on suggesting that American waters include the Pacific Ocean. After all, the United States had just fought a bitter contest with an Asian power for dominance of the ocean, and by 1947 US policy makers were concerned that another rival might challenge American control. This work attempts to show the divergent policy stances of various components of the American government as well as some of the disagreements within a given department. The affected players are the defense elements—Navy, Army, and Air Force—as well as the Departments of Interior and State. Each department and service had its own agenda, concerns, and internal disagreements over policy.

The author, Hal Friedman, arranges the text by agency, treating the military services first. As he points out, the services faced competition for funding in an era of rapid demobilization and sharp budget cuts. Each had to figure out how to maximize its advantage while offering a realistic approach to defending some portion of the Pacific—obviously too large for the smaller forces to handle completely. Issues included stationary defense (bases with ground forces) or mobile defense (fleets and aircraft). Another matter concerned which parts of the Pacific the United States would claim as its province. Though short on answers, the book does illustrate that the policy remained negotiable even as the Cold War began. Interior and State had different issues, the former wanting to extend its traditional role as overseer of US possessions or mandates overseas, and the latter wishing to avoid a situation that could lead to a charge of imperialism against the United States. Friedman brings out these issues clearly.

One cannot say the same for the debates, however—or the resolution of the matter. Indeed, these lacunae are what make the title misleading. *Governing the American Lake* has nothing to say about the actual administration of any given part of the Pacific by any element of the American government, civilian or military. It doesn’t even effectively define the approach to

administration chosen by the government for a given territory. In effect, it is simply a description of correspondence between high-ranking military and civilian officials, and, mostly, policy paper after policy paper. We find out little about how a given paper was received and little about how policy developed, who changed it, and who argued against or on behalf of a specific position.

The result is dry-bones reading, with the reader left wondering at the end why the author bothered. Though well researched and adequately written, as one would expect from an academic with previous publications in the field, *Governing the American Lake* fails to address the subject advertised by its title. On a positive note, however, even the author acknowledges that the Pacific is a comparative backwater for the United States in world affairs. Thus, a history of its administration during the shift from a hot to cold war is not vital. Only experts need pick up this work for more than a casual glance. Those seeking a political, military, or diplomatic history of the region during this period must look elsewhere.

Dr. John H. Barnhill
Houston, Texas

In the Shadow of the Moon: A Challenging Journey to Tranquility, 1965–1969 by Francis French and Colin Burgess. University of Nebraska Press (<http://www.nebraskapress.unl.edu>), 1111 Lincoln Mall, Lincoln, Nebraska 68588-0630, 2007, 448 pages, \$29.95 (hardcover), ISBN 0803211287.

Authors Francis French and Colin Burgess have continued the chronological narration of the American and Soviet human-spaceflight programs, which they began earlier in 2007 with publication of *Into That Silent Sea: Trailblazers of the Space Era, 1961–1965*. Now, the appearance on bookstore shelves of *In the Shadow of the Moon* sets the stage for additional volumes covering post-*Apollo 11* activities. These two titles represent a spectacular beginning for a series that the University of Nebraska Press has labeled *Outward Odyssey: A People's History of Spaceflight*. Simply stated, they whet readers' appetites for the rest of the story—the space shuttle, space stations, Earth-orbiting robotic spacecraft, and interplanetary missions.

Writing in a style and at a grammatical level appealing to general readers and space profes-

sionals alike, French and Burgess recount the challenges of the Gemini and early Apollo programs, along with disappointing setbacks and ultimate recovery in the Soviet human-spaceflight program. Their strong suit lies not so much in presenting new material or a new interpretation of existing information but in pulling together countless threads of detail and weaving them into colorful descriptions of events.

Furthermore, they keep readers' attention riveted on the human dimension of the story because they know that is the essence of history. The authors achieve this human focus, albeit primarily on the astronauts and cosmonauts themselves, by blending details from personal correspondence and interviews with information from published sources.

Because they cover both American and Soviet human-spaceflight programs and because some astronauts or cosmonauts went into space more than once, French and Burgess occasionally struggle to balance the chronology and coverage of specific individuals. Near the end of the third chapter, for example, the authors unexpectedly “fast forward” to Pete Conrad's participation in the Skylab project but restore the narrative's chronological integrity within a page or two. In the fourth chapter, they shift abruptly from *Apollo 1* and devote 15 pages to their first extensive coverage of Soviet activities. Although these rather awkward transitions might startle some readers, they represent exceptions in an otherwise flowing saga.

No one should make the mistake of thinking that a book written for a nonscholarly audience is devoid of scholarly analysis. Through careful examination of evidence from various sources, *In the Shadow of the Moon* dispels “myths” associated with the *Apollo 7* mission: that all three astronauts caught head colds and that the crew mutinied. The authors' discussion of how various spacecraft names and call signs originated, as well as how officials with the National Aeronautics and Space Administration (NASA) reacted to the astronauts' choices, is both entertaining and instructive. Perhaps the most thought-provoking bit of analysis in this volume pertains to the conclusion that Soviet Soyuz flights were “more meaningful and beneficial to the long-term use of space than those of Apollo” because Soyuz provided “the enduring workhorse of space travel” (p. 284). French and Burgess demonstrate how descriptive passages can convey sophisticated analytical points.

The most annoying features of this book, like those of its previously published companion volume, are the absence of annotations and an index. Perhaps the decision to dispense with these textual accoutrements reflects the publisher's purposeful aim toward a broader, less scholarly audience. For academicians, however, not knowing where the authors obtained specific, possibly controversial, details poses problems. Even those reading *In the Shadow of the Moon* at a less intellectually rigorous level occasionally might be curious about where the authors picked up this or that tidbit. Some clues appear in the narrative itself, but much is left to the reader's speculation. Similarly, if readers want to find where Deke Slayton, Pete Conrad, Vladimir Komarov, or anyone else is mentioned in this book, they must thumb through it, page by page.

Nonetheless, most members of the Air Force community will find *In the Shadow of the Moon* fascinating and easy to read. The accomplishments of Air Force test pilots who became NASA astronauts, from Gus Grissom and Buzz Aldrin to James Irwin and Charlie Duke, can instill pride. Those who know more of the story can pause between chapters to remember how countless, mostly forgotten, Air Force officers, enlisted, and civilian personnel working on the ground supported NASA's Gemini and Apollo programs, thereby helping win the race to the moon.

Dr. Rick W. Sturdevant
Peterson AFB, Colorado

The Road to Safwan: The 1st Squadron, 4th Cavalry in the 1991 Persian Gulf War by Stephen A. Bourque and John W. Burdan III. University of North Texas Press (<http://web3.unt.edu/untpress>), 1155 Union Circle, no. 311336, Denton, Texas 76203-5017, 2007, 336 pages, \$27.95 (hardcover), ISBN 1574412329.

We read historical accounts of battles and individual tales of bravery and heroism, but sometimes we can't put them in perspective because the stories lack presence; the author simply cannot place us alongside the primary characters. However, some authors do very well at incorporating a sense of involvement into their recounting of history. Some even go a step or two further, providing not only a good account but also some "takeaways" that inspire us to dive further

into the battle or a specific point. Stephen A. Bourque is one such author.

The 1991 Persian Gulf War has always held an element of attraction for me. I enjoy historical narratives of units with which I've served or have been associated, even if briefly. When I saw that Bourque had coauthored *The Road to Safwan*, featuring the history of the oldest and most decorated cavalry squadron in the US Army—the 1st Squadron, 4th Cavalry (1/4 Cav)—I had to read it.

Bourque and coauthor John W. Burdan III offer an interesting, cavalry-centric presentation of the squadron before, during, and immediately after conflict in the first Gulf War, describing four main operational phases (predeployment, deployment, employment, and redeployment). They credibly depict warfare at the battalion or squadron level and below by illustrating problems characteristic of such units. Not only do we learn the names of otherwise anonymous drivers and troop leaders, but also we learn about the people themselves. The running narrative employed by the coauthors allows us to get to know these main characters without enduring the tedium of a novel's character development.

The Road to Safwan is not without its problems, however. Bourque and Burdan have some strong opinions about US Army decisions leading up to the war (e.g., their discussion about the lack of tanks organic to the squadron organization [pp. 22–24]). Though their points are illustrative, repeated mention of these tangents proves distracting at times. Furthermore, the brief conclusion fails to expand on recurring themes or to propose solutions that could apply not only to the larger US Army but also joint operations. Such possible solutions include 1/4 Cav's unique approach to the reduction of friendly-fire episodes and to platoon-level live-fire exercises for combined ground cavalry and scout weapons teams (pp. 18–19). Also, the coauthors' retelling of squadron events does not address the pros and cons of using people on the ground versus remote technology. Lastly, the small print found in most of the combat and operational maps and graphics severely limits their usefulness; foldouts would have been much better.

Despite its shortcomings, this book is a solid review of the squadron's history in the first Gulf War, following the troopers' problems and triumphs from initial notification through their safe return home. Rather than confronting droll dates and facts, we come to know the squadron's leadership, from the commander down to the

troops. Admittedly, aside from affording readers the opportunity to understand Army—specifically, cavalry—operations, Airmen will discover few “lessons learned” in this book. Nevertheless, those of us who have a nostalgic interest in the history of armored cavalry will find *The Road to Safwan* a pleasant read.

Maj Paul Niesen, USAF, Retired

Scott AFB, Illinois

Breaking the Mold: Tanks in the Cities by

Kendall D. Gott. Combat Studies Institute Press (<http://www-cgsc.army.mil/carl/resources/csi/csi.asp>), Fort Leavenworth, Kansas 66027, 2006, 144 pages, \$12.00 (soft-cover) (available from the Government Printing Office, <http://bookstore.gpo.gov>), ISBN 0160762235. Available free at http://www-cgsc.army.mil/carl/download/csipubs/gott_tanks.pdf.

In this book, Kendall Gott attempts to examine the application of armored vehicles in urban environments. At first glance, he seems to offer an intriguing subject that has great potential as a case study of utilizing traditional technology to overcome unconventional situations. This should prove interesting to anyone familiar with the role airpower has played in recent years in Iraq and Afghanistan, considering that the strategy in these conflicts emphasizes asymmetric warfare instead of a traditional air campaign. Gott argues for specialized training and the use of combined arms at the lowest tactical levels, pointing out that when tanks are properly employed (and well supported by infantry) and operated by well-trained personnel, they are highly successful.

The book consists of five case studies, ranging from World War II to Operation Iraqi Freedom: Aachen (1944), Hue (1968), Beirut (1984), Grozny (1995), and Fallujah (2004). Each chapter includes the background of the conflict, a description of the battle, and an analysis (“In Retrospect”). The book also includes a brief introduction and a conclusion.

Chapter 1 describes the German defense of the city of Aachen against the Allied advance. Although Allied forces were not trained for urban combat, they ultimately achieved success by combining fire and maneuver. The main tanks used in the battle included the M4 Sherman and the M10 Tank Destroyer, the latter used in a sup-

porting role to the infantry as a mobile platform to reduce enemy positions.

In chapter 2, which details the aftermath of the Tet offensive and the retaking of the city of Hue during the Vietnam War, we find that US Marines relied on the M48A3 and the M50 to provide firepower and mobility. At the time, neither the Marine Corps nor the Army of the Republic of Vietnam had doctrine devoted to urban warfare. Though utilized in a support role, armor led limited advances on occasion. The battle demonstrated the ability of armored forces to move under heavy fire and bring firepower to the enemy in urban terrain.

Operation Peace for Galilee and the Israeli incursion into southern Lebanon, the subject of the third chapter, notes that the Israelis’ primary armor consisted of the M60 and the M113. Unlike the situation in the previous examples, the Israelis enjoyed specialized equipment and training in addition to established doctrine regarding the use of armor. Overall, their tanks performed well in Beirut but simply were not designed to fight in urban terrain. Inherent weaknesses included the inability of gun turrets to elevate to reach rooftops and tank commanders having to fight with their hatches closed to avoid sniper fire.

Chapter 4 discusses the Russian invasion of Chechnya, during which the hastily assembled and unprepared Russian Army—using the BMP-2, T-80, and BTR-80—faced a determined Chechen regular army and hardened guerilla fighters. Although the Russians enjoyed a distinct advantage numerically and technologically, they were routed by the Chechens, who used superior urban tactics in taking advantage of the narrow traverse radius of the main Russian battle tank and poor communication.

The final chapter deals with the coalition forces (Army, Marines, Navy, and Air Force) and Iraqi ground forces as they advanced into Fallujah during Iraqi Freedom. The two main armored vehicles of choice included the M1A2 and the M2A3, the former following the Marine advance and providing direct fire support to the riflemen. Breaking with tradition, armor actually led the assault into the city as the infantry offered cover and cleared buildings. In addition, the trailing allied Iraqi forces held captured buildings to prevent flanking by the enemy. By this point in the war, Americans had become highly proficient in urban warfare.

Unfortunately, *Breaking the Mold* falls well short of expectations. Originally written as five separate articles later thrown together, the book

manages only a thin connection between them in the form of the application of armor in each battle. Rather than emphasizing the author's main point, most of the text simply details the specifics of each battle. Due to the book's short length, readers will not have to invest too much time discovering this for themselves.

Capt Michael D. Kennedy, USAF
Yokota Air Base, Japan

Unknown Soldiers: Reliving World War II in Europe by Joseph E. Garland. Protean Press/Open Book Systems (<http://www.proteanpress.com>), 37-J Whistlestop Mall, Rockport, Massachusetts 01966, 2008, 528 pages, \$29.95 (hardcover), ISBN 0962578037.

I have read most of Joe Garland's books. This one, however, is quite unlike anything else he has written. I knew that reviewing *Unknown Soldiers* would be both interesting and a challenge. I began my review with two questions in mind: Who is Joe Garland of World War II? Is he capable of meeting his usual high standards despite writing in a completely different genre?

I thought this book was going to be an autobiographical account of his experiences as a member of the Intelligence and Reconnaissance (I&R) Platoon, Headquarters Company, 1st Battalion, 157th Infantry Regiment, 45th Infantry Division in World War II. It was—to a point. After he was injured and sent back to Italy, the narrative becomes more like an oral history, told by his comrades. Mr. Garland employs quite an interesting style that runs throughout his account of I&R in the war. At appropriate points, he inserts portions of an actual entry from the unauthorized record he kept. He also includes sketches he drew or part of an interview he conducted with one of his buddies while writing the book. I also learned that Willie and Joe, Bill Mauldin's cartoon characters, were composites of Garland's compatriots in the 45th Division. These enjoyable tidbits contribute a great deal to the narrative. Photographs of buddies, interspersed throughout the text in appropriate places, allow the reader to place a face with a name. I found myself referring back to them every now and again just so I could keep someone's likeness in my memory. This technique effectively brings Mr. Garland's experiences to life.

As soon as the reader thinks he knows the author's particular way of writing, Garland adds a new twist by changing the style of his gripping narrative. He demonstrates amazing versatility—for example, sharing a poem he wrote and recorded in his journal (pp. 214–16) and then reverting to the style to which I had become accustomed.

In chapter 11, he talks about the combat movement of the I&R Platoon from Rians to Livron, France, when the 157th Regiment—the platoon's parent—met the French Résistance, especially Henry Siaud and his two friends. At this point, the reader encounters “extensive excerpts” (15 pages) of Siaud's memoirs, which Garland translated himself. Fitting perfectly into the narrative, they allow us to see things from the perspective of the liberated.

For the rest of the wartime exploits of the I&R Platoon, Garland integrates these memoirs, thoughts from his notebook, and parts of interviews he conducted many years later with his wartime buddies. His weaving of all these elements together makes the narrative more personal and intimate. I felt like I was a member of his unit, helping win a war nobody wanted and liberating prisoners from their Nazi captors.

We see Garland's first use of humor during his in-processing at Fort Devens, Massachusetts, when he was interviewed and allowed to choose the arm of the Army in which he wished to serve. Well, as anyone who has been in the military knows full well, recruits really don't have a choice; the services just let them think they do. Garland opts for motorized infantry since riding sounded better than walking; however, the Army rewards him with a place in the infantry.

He soon learns that motorized infantry really means tanks, a choice that doesn't even rate as high as really bad because the chances of survival for the crew of a hit tank lie somewhere between slim and nil. At this point, he concludes that “in exercising the one and only option of my nascent career in the military I swung from flunking pre-med at Harvard to flunking the first lesson of survival out there: never volunteer” (p. 3). I really got a laugh out of that typical New England humor.

Readers also learn about the sequence of events along the Sele-Calore Corridor to Naples between November 1943 and January 1944, during which time the front moved forward and backward again and again. Here, Garland and his buddies live in a cave that can only be described as a decaying, feral rabbit warren.

When I began this review, I said that, after having read a number of Joe Garland's books, I wondered if he could meet his customary high standards. He not only met them but blew them away! Those who want to know about the war in Italy should read this book. Those who want to experience the liberation of the French from a French perspective should read this book. And those who want to see World War II through the eyes of an enlisted infantryman and his buddies should read this book. They will not be disappointed!

Dr. Donald A. MacCuish
Maxwell AFB, Alabama

NATO's Gamble: Combining Diplomacy and Airpower in the Kosovo Crisis, 1998–1999

by Dag Henriksen. Naval Institute Press (<http://www.usni.org/napress/index.asp>), 291 Wood Road, Annapolis, Maryland 21402-5034, 2007, 304 pages, \$24.00 (softcover), ISBN 1591143586.

NATO's Gamble examines the North Atlantic Treaty Organization's (NATO) strategy for Operation Allied Force in Kosovo. More precisely, author Dag Henriksen argues that NATO had no strategy prior to or during the initial stages of the conflict and that history, rather than events, guided its actions. In outlining matters relating to the operation, he highlights the transatlantic differences in philosophy regarding the crisis, illustrates how they affected NATO's actions, and points to them as the underlying reason for the lack of a unified strategy on Kosovo. Henriksen concludes that NATO stumbled into war in order to protect its credibility without any overall strategy—and that was NATO's gamble.

Using a case-study format, the author begins his analysis with the opening days of Allied Force by recounting the struggle between the military and NATO politicians over the conduct of the war. He paints a picture of disagreement and confusion over all of its aspects—targets, objectives, and pace of the war—and observes how the military would often hear of changes through press conferences instead of NATO channels. By focusing on the ideological differences between the military and diplomats, the remainder of the book reveals how NATO arrived at such a point. Establishing a foundation for his argument, Dr. Henriksen uses the development of airpower theory and history to show

the “shock and awe” mind-set prevalent in the Air Force and then employs a similar historical line of reasoning to demonstrate the US political leadership's beliefs regarding the linkage of force to diplomacy. Finally, starting with the origins of the Bosnia conflict in the early 1990s, he establishes a pattern of political and military events that created only minimal connection between the use of force and diplomacy as Allied Force began.

In addition to noting NATO's lack of coherent strategy, Dr. Henriksen examines principles of coercion to emphasize the necessity of a link between the use of force and diplomacy. Harkening back to Alexander George and his concept of coercive diplomacy, the author demonstrates how NATO's lack of an overall strategy caused the failure of coercion prior to the conflict. Although not fully developed, the discussion on coercion presents a strong reminder to military professionals and diplomats of the need to keep political goals in mind when designing military strategy and to establish links to those goals—precisely the sort of connection missing in NATO.

An airpower lecturer at the Royal Norwegian Air Force Academy and a captain in the Royal Norwegian Air Force, Henriksen used his doctoral thesis as the basis for *NATO's Gamble*. His study not only offers an interesting argument but also presents perspectives from multiple NATO members, even during discussion of the bipolar transatlantic divide. Furthermore, it considers the views of military officers and diplomats from many NATO nationalities, including some often missing from or minimized in other books on the subject. This sort of inclusiveness provides a well-rounded account from which even a reader quite familiar with Kosovo will likely learn something new.

Although aspects of this topic hold little mystery for many members of the Air Force community, *NATO's Gamble* is nevertheless worthwhile. In light of current events, conceptualizing military operations as supporting political strategy should have a familiar ring for most readers. However, harmonizing both of these elements in a coercive operation within the framework of a standing alliance presents complications that every military professional must understand. This book provides a case study of just such an instance.

Maj Lisa Nemeth, USAF
Fort Leavenworth, Kansas

Reflections of an Air Warrior by Group Capt Arjun Subramaniam. Knowledge World Publishers (<http://www.knowledgeworldonline.com>), 5A/4A Ansari Road, Darya Ganj, New Delhi 110002, 2008, 150 pages (hardcover), ISBN 978-8187966722.

Now here is a good book for the aspiring scholar-warrior who wishes to dedicate an evening to informative reading. Written by Group Capt (now Air Commodore) Arjun Subramaniam of the Indian Air Force, *Reflections of an Air Warrior* brings together a potpourri of previously published articles on a variety of subjects interesting to the audience of *Air and Space Power Journal (ASPJ)*.

The first section of the book holds particular appeal for those who spend their working days on the flight line—be they flyers or maintainers. Written in an engaging way with a focus on leadership, these pieces are concerned with the safe and effective running of a flying squadron. Not limited to the technical and operational details of the work, they also deal with morale, development of air leaders, and quality-of-life issues. The last of the articles in this part addresses in a practical way the “Ethics and Values in Military Leadership.”

But *Reflections* is much more than just a handbook for squadron leaders. Displaying a good acquaintance with the airpower literature of the US Air Force, the author includes a series of thoughtful chapters on that subject. One is about a transition facing the Indian Air Force in light of the great growth of the country's economy, India's broadening set of concerns outside its borders, and the perceived need to move from a tactical force to one that also has a strategic capability. He continues with a piece on the requirements to prepare for out-of-country operations and in this and other articles seems convinced of a convergence of interests for both India and the United States. Group Captain Subramaniam also offers a short essay regarding the growing power and changing strategy of China, which has some interests in common not only with India but also with other nations less obviously in harmony with his own country's interests.

Reflections of an Air Warrior provides useful insight from an informed, articulate, and well-read airman from another environment—insight useful for the audience of *ASPJ*. The only faults I noticed are the absence of a glossary (some of his acronyms are not common in the US Air Force) and an index, but neither omission is a

serious impediment. I therefore recommend that this book occupy a fairly high place on the reading list of air scholar-warriors.

Dr. David R. Mets
Niceville, Florida

Hans-Joachim Marseille: An Illustrated Tribute to the Luftwaffe's “Star of Africa” by Robert Tate. Schiffer Publishing (<http://www.schifferbooks.com/newschiffer>), 4880 Lower Valley Road, Atglen, Pennsylvania 19310, 2008, 224 pages, \$49.95 (hardcover), ISBN 0764329405.

Luftwaffe fighter ace Hans-Joachim Marseille is by any measure a compelling figure. In a combat career lasting barely two years, he was credited with shooting down 158 British and Commonwealth aircraft. Marseille's reputation was enhanced by his legendary skill: his victories required an average of only 15 rounds of ammunition, and on many occasions he scored multiple “kills” in a single sortie. All who saw him in combat agree that he was a phenomenal marksman, a uniquely gifted pilot, and a genuine “character.” He achieved most of his success in the desert campaign in North Africa, in many ways a “clean” war far removed from the atrocities of the Eastern Front. By some accounts, Marseille fought his war with chivalry, personally delivering word of the fate of downed Allied pilots to enemy airfields and refusing to fire at enemy aviators floating helplessly in their parachutes. He also seemed to care little for National Socialist ideology, a fact reflected in his taste for swing music and his befriending a black man. Finally, he died unbeaten by the enemy—while bailing out of a malfunctioning aircraft, he was struck by the tailplane.

Robert Tate, a retired Air Force officer and current airline pilot, has drawn upon a lifelong fascination with Marseille to produce this lavishly illustrated volume. Tate does not duplicate the narrative information contained in previous Marseille biographies and offers little treatment of the ace's early life or family history. Rather, he concentrates on Marseille's North African service with fighter wing Jagdgeschwader 27—his tactics, aerial victories, personal and professional qualities, and the assessments of those who flew with and against him.

The book's graphic and production values are a major part of its appeal. The photograph selection and reproduction are outstanding. Tate has tracked down items from public and private collections worldwide, using them to document thoroughly Marseille's brief and spectacular career in North Africa. Especially striking are photos of a combat-stressed, prematurely aged 22-year-old Marseille, taken the day before his death. Newspaper and magazine items, as well as vintage postcards, demonstrate how the German propaganda machine elevated aces like Marseille to celebrity status.

With regard to faults, the book is not based on any major new documentary evidence. In fairness to Tate, some of this is unavoidable—Marseille himself seems to have left no writings. This consummate aerial tactician evidently never penned a tactics manual or set of rules along the lines of the "Dicta," by World War I ace Oswald Boelcke. In addition, the surviving Luftwaffe records related to Marseille are fragmentary. The author does draw interesting information from some of Marseille's comrades and acquaintances although much of it comes from a comprehensive review of English-language accounts and memoirs. More focused editing of the book would have removed some of the repetitive, verbatim use of quoted material from these sources. More surprisingly, Tate does not refer to some of the standard sources on the subject, most notably Karl Gundelach's classic history of the Luftwaffe in the Mediterranean. Neither does he seem to have consulted British or American official sources, published or unpublished. It would be interesting to see what (for example) Royal Air Force air intelligence reported about Marseille's accomplishments.

These criticisms aside, this book has much to interest students of aerial warfare. Tate offers a cogent commentary on fighter tactics, some of which have changed little since Marseille's day. Although the treatment of Marseille is generally positive, Tate brings some critical analysis to bear on subjects ranging from the veracity of Marseille's victory tally to the lack of strategic success that accompanied the ace's tactical exploits. He rejects the notion that Marseille's successes were the result of his being pitted against inferior adversaries. The author also makes some judicious and intriguing observations about Marseille's association with the Berlin "counterculture" (such as it was) that enjoyed jazz music and flouted authority. On the whole, *Hans-Joachim Marseille* is a well-constructed book

that will interest students of the Luftwaffe, fighter tactics, and World War II.

Dr. Richard R. Muller
Maxwell AFB, Alabama

The Star Wars Enigma: Behind the Scenes of the Cold War Race for Missile Defense by

Nigel Hey. Potomac Books (<http://www.potomacbooksinc.com>), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2006, 288 pages, \$22.36 (hardcover), \$15.16 (softcover), ISBN 1597970050.

In today's international struggle against terrorism and insurgency, the Cold War can sometimes feel like ancient history. It was a completely different conflict of near-perfect symmetry that locked the globe in a strategic stalemate—a stalemate threatened by Pres. Ronald Reagan's announcement of a plan to protect the United States and its allies against a Soviet nuclear attack without having to rely on the deterrent of a counterstrike. In *The Star Wars Enigma*, Nigel Hey provides a vivid historical account of the politics and science that fueled President Reagan's vision of a world free from the threat of nuclear war. He traces the Strategic Defense Initiative (SDI) from scientific theory and debate to its crescendo as one of the defining political issues at the end of the Cold War.

The Star Wars Enigma attempts to illuminate two key questions surrounding President Reagan's SDI: (1) Was a space-based shield from nuclear attack technologically possible? (2) Did it really matter if it would work or not, or was the threat of "Star Wars" enough to attain US political objectives? Hey cites scores of scientists and administrative officials from both the United States and Soviet Union who believed that such a system was not possible in their generation. He also reveals that the Soviets had such high regard for American ingenuity and technology, demonstrated in the Manhattan and Apollo projects, that they could not risk ignoring the threat of an impenetrable nuclear shield over their enemies. The book rightly does not attempt to answer the first question; it simply shares the thoughts of scientists and leaders who were there. The book answers the second question in context. Many of the author's sources thought that the United States intended the SDI as a political tool to pressure the Soviet economy into collapse; others saw it

as a legitimate technology program aimed at defending the nation. In the end, it did not really matter. The book reveals that Soviet leaders considered the SDI a vivid threat to the balance of power, adding another layer of complexity to their mounting domestic troubles.

In *The Star Wars Enigma*, Hey does not attempt to challenge any of the conventional wisdom surrounding the SDI or its impact on the Cold War. He does, however, walk the reader through the history of space-based missile defense in an entertaining and nontechnical manner. The book focuses on the blurry line between politics and technology, but Hey manages to throw in some cloak-and-dagger vignettes (e.g., murder and bombings of SDI contractors in Europe, p. 181) that highlight the SDI as more than simply a technical challenge. Further insights into the people and personalities involved add a human context to the SDI, reminding the reader that the fear of nuclear war was omnipresent in the 1980s. In telling the story, Hey draws on his associations with many of the key scientific players in the SDI from his time as a senior administrator at Sandia National Laboratories. He fills in the rest of the details by means of thorough research of the literature and media as well as one-on-one interviews with scientists and decision makers from the United States and former Soviet Union.

Today, one finds the remnants of the SDI in the Missile Defense Agency and its systems for national missile defense (NMD). Although space-based lasers no longer represent the central technology, much of the current developmental system has its roots in the SDI. *The Star Wars Enigma* is a worthwhile read for anyone in the Air Force or NMD community who seeks a concise, entertaining, and accessible account of the SDI saga and its contributions to our current effort.

Maj Eric J. Kolb, USAF
Fort Leavenworth, Kansas

Preparing the Army for Stability Operations: Doctrinal and Interagency Issues by

Thomas S. Szayna, Derek Eaton, and Amy Richardson. RAND Corporation (<http://www.rand.org/publications/index.html>), 1776 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138, 2007, 276 pages, \$31.50 (softcover), ISBN 0833041908. Available free from http://www.rand.org/pubs/monographs/2007/RAND_MG646.pdf.

The United States overthrew the Taliban and Baathist regimes in Afghanistan and Iraq, respectively, believing that the populations of both countries would smoothly transition to democratic governments. Misconceptions and missteps in the aftermath of those successful military operations allowed for the creation of environments conducive to the growth of insurgencies and the introduction of terrorist activities against the populations and military forces alike. We found it tough going to stabilize both countries so their people could build functioning governments.

By 2004 the US government had begun a comprehensive study of the stabilization process. For its part, the Army engaged RAND's Arroyo Center to examine the issue. The report of that study, *Preparing the Army for Stability Operations*, explains the construct of such operations as a US government effort in which the Army has a significant, perhaps the most significant, part—but only a part, nonetheless. It shows that the Department of State has regulatory responsibility as the lead government agency in stability operations and recognizes that the Army cannot simply assume that State or any other agency can or will rise to the requirements inherent in that responsibility. Since the Army is the preeminent element of US land power (operating on the medium where forces establish stability) in an environment in which failure is not acceptable, the Army must proceed as if it will have sole responsibility for establishing stability after the completion of military operations.

After an in-depth explanation of the study construct, the book dissects the requirements for interagency cooperation in stability, security, transition, and reconstruction (SSTR) operations, including a look at Army doctrine. That examination reveals three main insights regarding tactics, techniques, and procedures (TTP); gaps and seams in the current doctrine; adjustments required in the Army Universal Task List (AUTL) and in definitions of Army tactical tasks (ATT). (Like this paragraph, the book is full of acronyms that will quickly confuse all but the most studious readers. Fortunately, the authors include a list of abbreviations for easy reference.)

The study offers 56 specific recommendations in three categories: (1) that the Army serve as the medium in defining the roles and missions of various agencies engaged in stabilization missions; (2) that the Army use its experience with provincial reconstruction teams to advise other agencies in the establishment of advance civilian

teams; and (3) that decision makers consult the study's list of Army doctrinal recommendations.

Preparing the Army for Stability Operations serves as an excellent adjunct to Army Field Manual 3-07, *Stability Operations*, October 2008, and other doctrinal publications. However, unlike the actual doctrinal manuals, this is not a how-to book on stability operations but a breakdown of those operations as a system. Non-Army readers many find themselves feeling left out, given the study's unabashedly Army-centric slant. However, considering that every military member, no matter what service, may one day pursue the stability mission as part of a joint/combined team, this book should find a wide audience.

CSM James Clifford, USA, Retired
McDonough, Georgia

Educing Information: Interrogation: Science and Art: Foundations for the Future,

Phase 1 Report, by the Intelligence Science Board. Center for Strategic Intelligence Research, National Defense Intelligence College Press (<http://www.dia.mil/college/press.htm>), Washington, DC 20340-5100, 2006, 339 pages (hardcover), ISBN 1932946179. Available free from <http://www.fas.org/irp/dni/educing.pdf>.

Everybody agrees that information is power. In the global war on terror, a particularly passionate, continuing debate concerns a specific form of information gathering: the interrogation. One can express the essence of that debate with the question, What means of securing important, time-sensitive information from an uncooperative individual is both effective and acceptable? (Indeed, the single, subconscious theme found throughout the book deals with what must be done to prevent another Abu Ghraib.) More a call to action for the organized accumulation of vital data than a repository of concrete answers, *Educing Information* begins a laborious process to address that question.

The book consists of a series of 10 essays by nine authors, loosely organized into three subject areas: an overview of interrogation tech-

niques and procedures, the status of current interrogation training, and recommendations for future research. Each author, handpicked by the Intelligence Science Board for his or her particular expertise on the subject, boasts considerable doctoral-level experience in behavioral science, psychology, neuroscience, and negotiation theory. The individual essays not only add substantial value to the collection as a whole but also can stand alone as a source of detailed information on their particular subjects.

Two messages clearly resonate in each piece. First, using torture to procure information is ineffective, often produces erroneous data, and is not worth the political price paid by a democratic government. Second, we need much more research to discover efficient, accurate, and morally acceptable means of interrogation.

Despite the existence of an Army manual that addresses interrogation tactics, techniques, and procedures, the book's authors believe that most interrogation specialists learn predominantly from anecdotal advice and personal experience—one of the major criticisms of current interrogation operations. Two essays explore training programs of domestic police forces as well as programs in the United Kingdom, the latter described as anemic and of dubious worth to professionals responsible for questioning criminal suspects. Clearly, such a program does not hold the answer to the question under study.

The most interesting part of this collection deals with the incorporation of negotiation theory within the process of interrogation. Viewing such questioning as a series of complex negotiations opens up a robust and effective line of research. This may represent the most promising avenue of approach for further improvement.

Designed specifically for intelligence professionals, *Educing Information* has little value in and of itself to Air Force readers unless they have direct responsibility for interrogation operations. Politically, the book is very interesting because it offers a glimpse into the intelligence community's first reaction to the Abu Ghraib crisis. An excellent first attempt at addressing the much-debated interrogation question, it proceeds not so much by providing guidance as by setting the table for answers.

Lt Col Christopher D. Harness, USAF
Maxwell AFB, Alabama

Submissions

We're always looking for good, thought-provoking articles up to 5,000 words in length. We will return articles substantially longer than that to the author without review. We edit all submissions in accordance with AU-1, *Air University Style and Author Guide* (available online at http://aupress.au.af.mil/Resources/style/austyle_guide.pdf), a process that may include grammatical and structural as well as stylistic changes. Because *ASPJ* serves an international audience and is readily available to foreign individuals, organizations, and governments, information contained in the article must be unclassified, nonsensitive, and releasable to the public.

Please assure that the articles you submit are concise and straightforward; moreover, the active voice should predominate. Avoid overusing jargon and "mission specific" language since it reduces coherency and reflects a lack of creativity and careful thought. Titles should catch a reader's attention rather than serve as an executive summary or overview of the article.

We seek articles that teach and/or persuade; therefore, we rarely use thesis papers in their original form because they function principally as learning tools for students.

Because *ASPJ* is a scholarly journal, you will need to include citations for all but the most basic submissions (e.g., Ricochets and Replies). Do not include bibliographies, lists of works referenced, or appendices; instead, include all information in the body of the article or appropriate endnotes, which must be hyperlinked to the text referenced. We accept only black-and-white, noncopyrighted graphics, which you should send as separate files, with a placeholder included in the document to show approximate location.

For further details, see our submissions guidelines at <http://www.airpower.au.af.mil/airchronicles/howto1.html>. You can contact us by e-mail at aspj@maxwell.af.mil or phone at DSN 493-2949 (commercial [334] 953-2949).

Subscribing to *ASPJ*: Both Printed and Electronic Subscriptions Are Available

Printed copy

- Government and military (foreign and domestic): the *Journal* is available free to all USAF organizations. If your organization is not receiving the desired number of copies, please contact us. Other US government and foreign military organizations may also receive the *Journal* for free. Contact the editor at aspj@maxwell.af.mil for information.
- Nonmilitary and nongovernmental organizations: see the order form on the next page.

Free electronic copy

- Receive the *Journal* electronically by logging on to the "Subscription Center" at the Air Force Link Web site <http://www.af.mil/subscribe>, selecting any of the *Air and Space Power Journal* language editions, and subscribing. It's *free*!

The Editor

2010 CSAF READING LIST



First Quarter Recommendations from General Schwartz

LeMay: The Life and Wars of General Curtis LeMay, by Warren Kozak, traces the life of General LeMay, from his firebombing of Tokyo and guardianship of the US nuclear arsenal in the Cold War to his frustrated career in government and short-lived political run.

In the Graveyard of Empires: America's War in Afghanistan, by Seth Jones, provides a historical review of Soviet and US experiences in Afghanistan but also assesses Pakistan's role and potential in securing Afghanistan.

A History of Air Warfare, by John A. Olsen, is a comprehensive analysis, through a compilation of 16 essays from leading military writers, of the role that airpower has played in military conflicts during the last century.

Cyberdeterrence and Cyberwar, by Martin C. Libicki, addresses the differences between cyberwar and war in other mediums, and describes ways that the United States could protect itself in the face of attack.

Other Books in This Year's Reading List

The Accidental Guerrilla: Fighting Small Wars in the Midst of a Big One by David Kilcullen

Wired for War: The Robotics Revolution and Conflict in the 21st Century by P. W. Singer

On Nuclear Terrorism by Michael Levi

MacArthur's Airman: General George C. Kenney and the War in the Southwest Pacific by Thomas E. Griffith

A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon by Neil Sheehan

Daring Young Men: The Heroism and Triumph of the Berlin Airlift, June 1948 – May 1949 by Richard Reeves

7 Deadly Scenarios: A Military Futurist Explores War in the 21st Century by Andrew Krepinevich

Guardians of the Revolution: Iran and the World in the Age of the Ayatollahs by Ray Takeyh

Rivals: How the Power Struggle between China, India and Japan Will Shape Our Next Decade by Bill Emmott

for more information

<http://www.af.mil/information/csafreading/index.asp>





RESEARCH
OUTREACH * ENGAGEMENT